FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 267. (No. 6, Vol. VI.)] FEBRUARY 7, 1914. [Registered at the G.P.O. as a Newspaper.] [Weekly, Price 3d. Post Free, 3½d.

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.
Telegrams: Truditur, Westrand, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.
United Kingdom ... 15s. 0d. Abroad ... ... 20s. 0d.

CONTENTS.

	PAGE
Editorial Comment:	
An Air Race Round the World	131
The Future of Our Flying Officers	131
Men of Moment in the World of Flight: Signor Enrico Forlanini	133
Flying at Hendon	134
Aero Engines at the Paris Show, 1913	135
Armchair Reflections. By "The Dreamer"	137
Royal Aero Club. Official Notices	138
From the British Flying Grounds	140
Eddies. By "Will o' the Wisp"	142
The Thomas Flying Boat	143
Some Notes on the Principles of Steering and Stability in Aeroplanes. By Maurice J. Dodd, Assoc.M.Inst.C.E.I.	144
An Aeroplane in the Making	148
Foreign Aircraft News	150
Correspondence	152
Models. Edited by V. E. Johnson, M.A.	154

EDITORIAL COMMENT.

An Air Race Round the World.

It is announced that the Aero Club of America has sanctioned a projected air race round the world, starting from the San Francisco Exposition in May of next year. The idea seems to have originated with the exposition authorities, who are offering a prize of no less than £20,000 to the aviator who succeeds in putting a girdle round the earth in ninety days. On another page of this issue of FLIGHT will be found a map indicating the proposed route of the flight, together with other details and distances.

Wonderful as has been the progress made in flight, we do not think for a moment that the £20,000 offered as the first prize will change hands in 1915. There are so many physical difficulties to be encountered in connection with an aerial journey of such magnitude that, without predicating its impossibility, there is so great an element of doubt about it, as to almost put it out of the question. At the same time, the strides made in aerial navigation are so astonishing in their rapidity, that it is more than ever unsafe to indulge in prophecy, and we can thus only wait and see. It may be pointed out, however, that in order to win the money of the San Francisco exposition authorities, the successful airman would in all probability incidentally qualify for the £10,000 prize of the *Daily Mail* for a Transatlantic flight, and that the prospects of even the latter being won this year or next are anything but assured. Apart, however, from any inherent probabilities connected with this specific event, it may be pointed out that the offer of the prize and the fact that it is being seriously discussed by the experts, while even from outside the criticisms are all seriously worded, is eloquent of the progress to which we have already made passing reference.

It is a well-worn theme, but one which nevertheless is of constant interest, this question of day to day progress, and we therefore make no apology for constantly reverting to it. Not so very long ago the offer of £10,000 by the *Daily Mail* was laughed to scorn by the Press and people of the world, who with one accord set the offer down to a desire to obtain a cheap advertisement. Then almost as much amusement was caused later by the offer of prizes for a cross-Channel flight, until one morning the world awoke to find that a French aviator—to wit, M. Blériot—had actually accomplished the Channel flight. Then people began to think that there was really something in this new movement, and by the time the realisation had sunk in, another Frenchman had given the lie to the scoffers by winning the *Daily Mail's* money, and aviation had really arrived. Since then progress has been so bewilderingly rapid that the thing which would have been voted a fairy tale yesterday is accepted as a plain statement of fact to-day. It is this aspect of the projected round-the-world flight that most appeals to us—that its *bona fides* are accepted without question, and that people are discussing its possible realisation with as much calmness as they discuss the latest strike news from South Africa.

◆ ◆ ◆

The Future of Our Flying Officers.

The Naval Correspondent of the *Morning Post* has raised the question of the future of our flying officers, particularly with regard to those of the Naval wing of the R.F.C. He points out that a new, inevitable and increasing addition to the Navy Estimates is involved in the maintenance and extension of this Wing, a service which draws upon the number of officers available for the Fleet. Each officer who enters the Flying School is an officer withdrawn from the ordinary service of the Fleet, and the number entering the School continues to increase. What the future of these officers is seems to be

uncertain. At present the executive and Marine officers, having qualified in flying, may be required to rejoin the Fleet. Thus the flying branch is treated as incidental to he Navy itself, and service in it is temporary. As the *Morning Post* correspondent points out, the flying service is so highly specialised an occupation that the development of a new system seems probable. Entrance into the flying service is already open to others besides naval officers, and it may be that it will become a separate service while remaining under naval command.

We do not know if the *Morning Post* expert is speaking by the book, or whether he is merely regarding the thing from the apparently most logical standpoint. If his remarks are prompted by inside knowledge of official intention, then we may say that we are exceedingly pleased to hear it. If, however, the second hypothesis is the correct one, then we agree absolutely that there is an excellent case for the establishment of a separate service, separate, that is, in the way that the Royal Artillery or the Royal Engineers are separate and distinct branches of the Army, having their own self-contained organisation and their own especially trained *personnel*, but subject at all times to the orders of headquarters.

These two are specialist branches, entailing special knowledge and special training for proper efficiency. No one with any pretensions to knowledge of Service matters would argue for a moment that the gunner officer should be attached to a school of gunnery for a short course of training, and then sent to an infantry battalion for duty to be called upon, possibly, in case of war to do duty with the scientific arm and to find himself hopelessly out of touch with the most recent developments of the branch of the Service.

How much more does the specialist argument apply in the case of flying, for which constant practice and continuous training are so essential? Regarding the question from that—which, we submit, is the only—point of view, the arguments seem to be absolutely clear for making the R.F.C., both Military and Naval Wings, an entirely separate and distinct branch of the Services, not, as has been advocated by some, by the constitution of a new Service, distinct from the Navy and Army altogether, but as specialist branches to which officers and men are entered on a permanent and non-transferable basis. Thus, and thus only, we believe, can we secure that body of trained and practised pilots with the necessary reserve against the wastage of war, which we shall one day find so vital to the national safety.

In support of the arguments we have put forward, let us regard the case of France where the same system as our own obtains. Officers and men have been allowed to volunteer from their various units for training as pilots, to be sent back to regimental duty at the expiry of their period of training. The result of the system has been that now the number of volunteers for the air service has fallen almost to vanishing point. According to the latest available figures, the number of volunteers in 1911 was over 1,500. In 1912 only 300 presented themselves, while last year the figures fell to *22*! In some measure this appalling drop may be ascribed to the internal troubles of the French air service—the "scandals," as they are described in the French Press—but in great part we believe the cause is to be found in the fact that there is no security of tenure. The man who desires to specialise in some particular branch wants continuity of employment in that branch, and it does not satisfy him to receive a more or less perfunctory training in it and then be sent back to take the ordinary duty he has escaped during his specialist days. The system is neither good for the Service nor for the keenness of the men themselves. True, this trouble has not so far spread to our own Services, in fact, quite the contrary, but there are possibilities of it ultimately doing so, which again is an argument for the creation of that special branch we are advocating.

SIGNOR ENRICO FORLANINI.

OUR "Man of the Moment" this week is Signor Enrico Forlanini, the designer and constructor of the dirigible airship bearing his name, and which has found much favour in the eyes of those who are advising the British Government, resulting in the decision to acquire three of this type as a commencement. The formal order for the first of these was placed by the Admiralty through Sir W. G. Armstrong, Whitworth and Co., and the vessel will be constructed by the "Societa Leonardo da Vinci" near Milan. Other airships of the Forlanini type are to be built under licence in England by the Armstrong Co. We understand that the dirigible now ordered, though embodying several important improvements and modifications, will be of similar type and design to the "Citta di Milano," which was described in FLIGHT for January 24th, and which was taken over by the Italian Army last August.

We learn that the British rights of construction were obtained, and all negotiations in Italy were carried through on behalf of the Armstrong Company by Messrs. Delacombe and Maréchal of London.

THE HAWK.

Annual Dinner of the Royal Aero Club.

THE date arranged for the Annual Dinner of the Royal Aero Club is Friday, the 27th inst., and it will be held at the Royal Automobile Club. The Marquess of Tullibardine, M.V.O., D.S.O., M.P., Chairman of the Club, will preside, and the distinguished guests present will include the Right Hon. Winston S. Churchill, M.P., First Lord of the Admiralty.

British Entries for the Gordon-Bennett Race, &c.

TWO entries have already been received by the Royal Aero Club for this year's Gordon-Bennett Race, one being from A. V. Roe and Co., and the other from the Sopwith Aviation Co. The latter firm has also entered for the Jacques Schneider Maritime Cup. Entries for both these international events close on Tuesday, the 24th inst.

£1,000 for Imperial Air Fleet Committee.

IN response to the appeal made by the Imperial Air Fleet Committee, the distributors of "Shell" Motor Spirit have made a donation of £1,000, this being the second donation from this source.

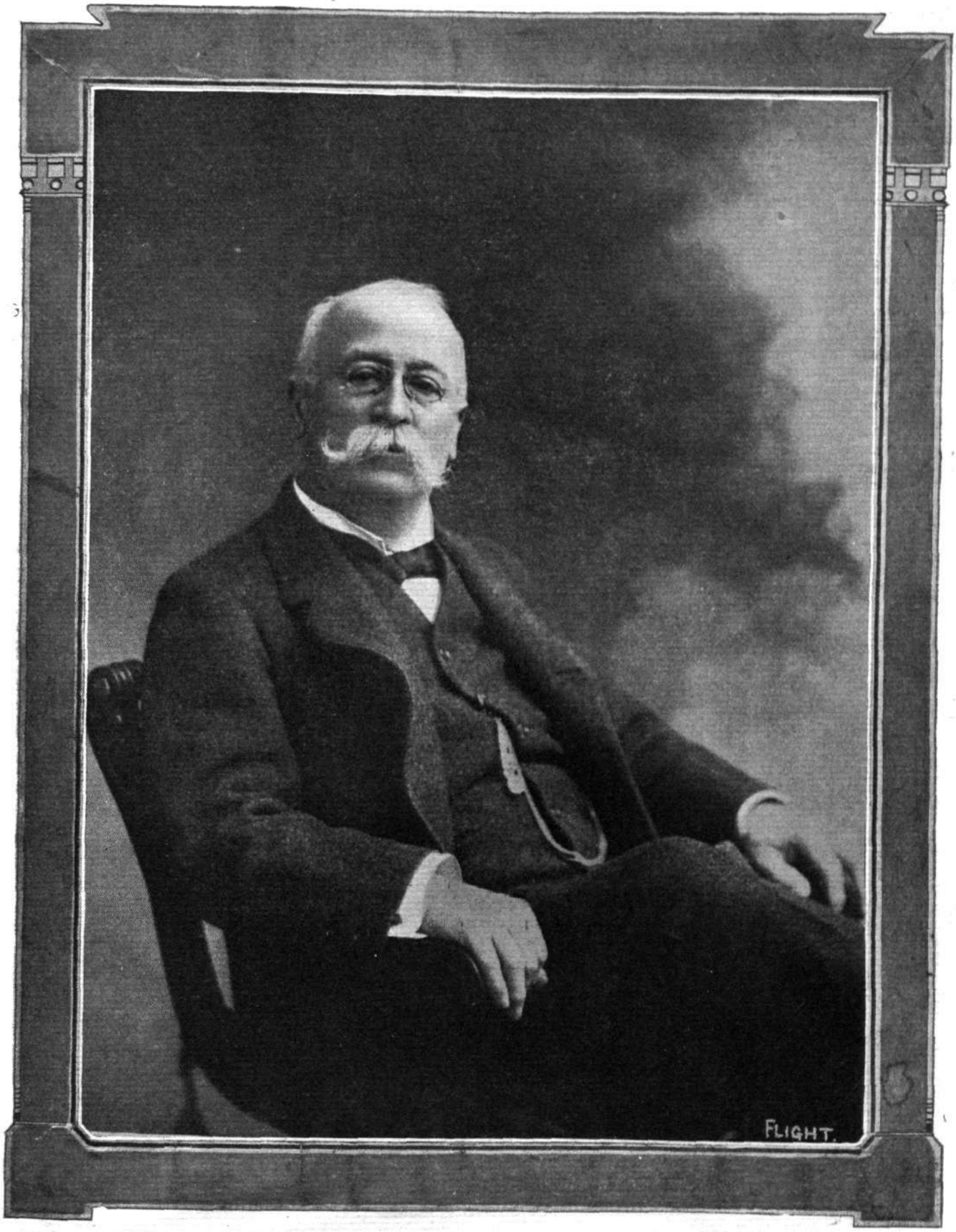
A Council for French Military Aeronautics.

As a result of the report, made to the Senate by Senator Reymond, on the state of French military aeronautics, M. Noulens, the Minister of War, has appointed a Supreme Council to control the workings of the reorganised Air Department of the Army. The Council includes four Senators, four Deputies, four members of the Institute of France, and one representative each of the Automobile Club, the Aero Club, the National Aerial League, and the University of Paris.

Index and Title Page for Vol. V.

THE Index and Title Page for Vol. V, January to December, 1913, has now been printed, and can be obtained by sending 2*d.* to the publishers, 44, St. Martin's Lane, W.C. After February 21st the price will be 6*d.* post free.

MEN OF MOMENT IN THE WORLD OF FLIGHT.



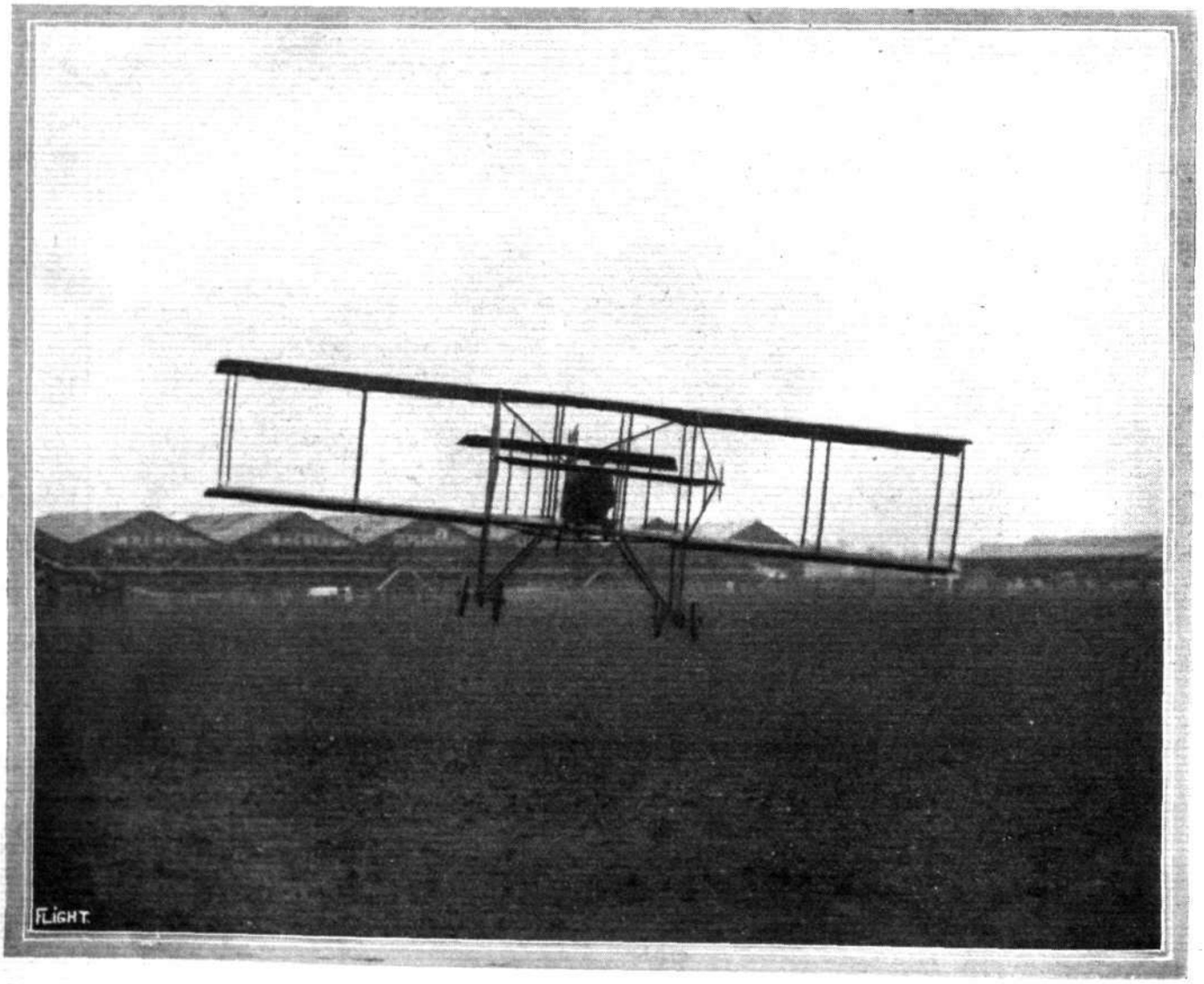
SIGNOR ENRICO FORLANINI.

FLYING AT HENDON.

VERY little flying took place at Hendon last Saturday on the occasion of the Metropolitan Meeting, owing to the somewhat dangerous wind that prevailed. It was blowing from the south-west in strong gusts varying from 30 to 40 m.p.h., but otherwise it was not so very unpleasant on the ground, and not anything like so cold as it had been the last four or five meetings. Arrangements had been made to hold a speed handicap round the aerodome, but conditions did not look at all favourable for this kind of event, so at 3 o'clock Louis Noel, with a passenger, braved the elements on the 75 h.p. Maurice Farman in order to ascertain what it was like up above. Noel's machine was blown about in an extraordinary, not to say alarming, manner, but he remained up for some considerable time, and made several circuits of the aerodrome. When flying broadside on to the wind the biplane appeared to make about as much progress sideways as it did forwards—which made it very strange to watch. Just as Noel was about to land, Philippe Marty came out on the Morane-Saulnier monoplane, and taxied out over to the far end of the aerodrome in order that he might get off head to wind. He turned round and started off, but had hardly got up speed when, owing to the bumpy nature of both ground and wind, the left wing tip struck the ground and the machine made a terrific cart wheel, the left wing crumpling up under the body and the nose of the machine digging into the ground with the tail pointing upwards; it then settled down on its side with the right wing vertical. Marty was thrown out a yard or two from the machine, and remained lying on the ground for about half a minute, and then everyone was relieved to see him try and get up. He was unable to walk, however, and he was seen to fall back again. Assistance was quickly on the way to him, and Noel, who had just landed, flew over to the scene of the smash, the ambulance car, with Dr. A. B. Leakey in charge, being close behind. Marty was speedily attended to, and it was found that fortunately he had only sustained slight injuries to his legs and chin, although, of course, he was also badly shaken by the fall. On examining the machine, the damage done was found to consist of a broken left wing, elevator, engine and propeller, but otherwise little or no further damage was done. Whilst Marty was being attended to, F. W. Goodden taxied over on the 45 h.p. Caudron, and, on learning that nothing serious had occurred, ascended. He put up a really brilliant exhibition flight, reaching a good height and making some fine banked turns. Noel had reported that it was unsuitable for racing, it being very tricky near the ground, so it was announced that the race would have to be cancelled. By this time it was 4 o'clock, and Noel made another flight on the Maurice Farman, accompanied by a passenger. The machine was taxied out to the far side of the aerodrome, held down by a man at each wing tip. On turning round and starting off against the wind, the biplane was lifted almost vertically off the ground. Its progress towards the enclosures was exciting to watch, for it was with difficulty that Noel kept it up, and he was almost beaten to the ground several times. However, he made several circuits of the aerodrome, and, except for another short flight, the proceedings were brought to a close. Amongst the visitors during the afternoon were noticed Marcel Desoutter and B. C. Hucks.

Sunday was much brighter, but the wind was still against much flying. Claude Grahame-White and Louis Noel, however, went out several times, and put up some very fine exhibitions of wind fighting. Both flew the 75 h.p. Maurice Farman biplane.

The February Meeting will take place this (Saturday) afternoon at 3 p.m., the principal event being a 16-mile cross-country handicap.



"Flight" Copyright.

A NEAR THING FOR OUR PHOTOGRAPHER.—A direct snap from in front of Mr. Reginald Carr on the G.-W. biplane at Hendon Aerodrome.

FLIGHT

AERO ENGINES AT PARIS SHOW, 1913.

(*Continued from page* 122.)

D'Henain.

A 7-cyl. 50 h.p. engine was exhibited of a somewhat similar design to the small 10–12 h.p. air-cooled rotary engine shown at the 1912 Show. This engine differs in several ways from the usual type of rotary engine. For example, the cylinder and crank-case are made in one piece of cast-iron instead of in steel with the parts made separately. Further, the cooling fins on the head of the cylinder radiate from the centre of the cylinder. The valve mechanism was described in *The Auto.* of January 11th, 1913, and resembles that used on the rotary Clerget engines by the employment of two special eccentric plates, one for the inlet and the other for the exhaust. These are mounted on ball-bearings over the crank-shaft, and have toothed recesses formed in its periphery, into which the push-rods for actuating the valves fall in turn as the shaft rotates. By moving these plates the times of opening and closing the valves may be varied.

The crank-shaft is supported on ball-bearings, which are also fitted to the crank-pin, and as is usual in this type of engine the gas is taken through the hollow crank-shaft through radial ports to a chamber cast within the crank-case, from which it is distributed by piping to the various cylinders.

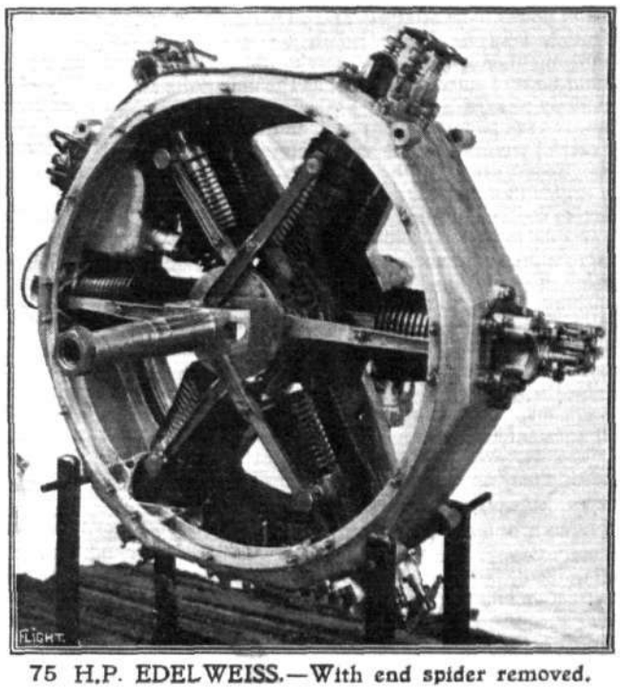
The lubrication of the cylinder and piston is effected by mixing oil with the air carried over into the cylinder.

Edelweiss.

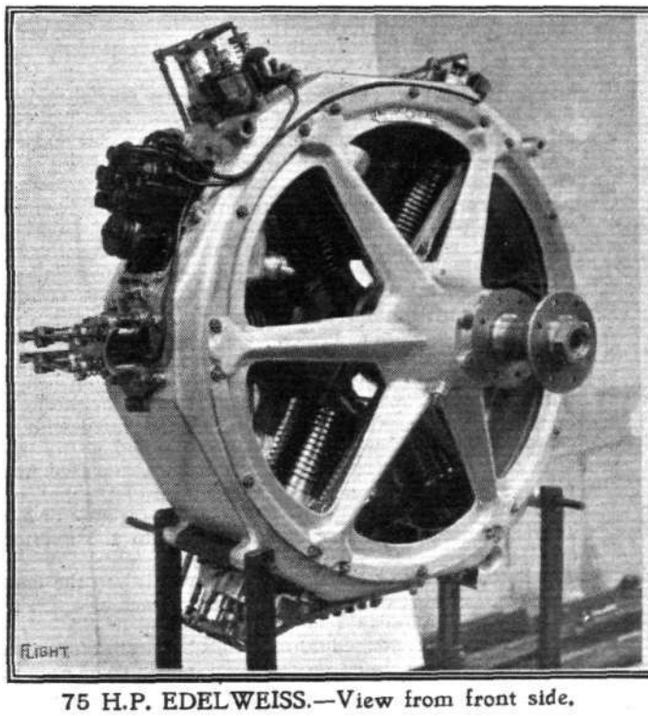
These motors embody an extremely interesting construction, somewhat similar in principle and design to the Weisz four-cylinder engine exhibited at Paris in 1910 (see FLIGHT, October 29th, 1910).

In these engines the pistons are fixed, and the cylinders of high tension steel are reciprocated by exceptionally long connecting rods attached to the crankpins—each cylinder having two connecting rods, which are fastened together so as to gain greater lateral rigidity by two bolts passing between them immediately beneath the piston. There are three cranks to the shaft, the two outer cranks being placed at an angle of 180° with the centre crank. The cylinders are virtually arranged in sets of three on the six-cylinder, and in sets of five on the ten-cylinder, as one set in each engine is driven by the centre crank, and the other set by two outer cranks. Gudgeon pins are formed upon the outer ends of the cylinders, which have blank inner heads, whilst air-cooling fins are turned on the cylinder barrel. The pistons, which are of cast iron and have three rings, all lie in the same plane at right-angles to the axis of rotation, and are attached to a polygonal aluminium casing that resembles in appearance the field magnet casting of a dynamo, the pistons corresponding to the pole pieces. The valves, both of which are mechanically operated through rocking levers, as well as the sparking plugs, are placed in the end of the piston.

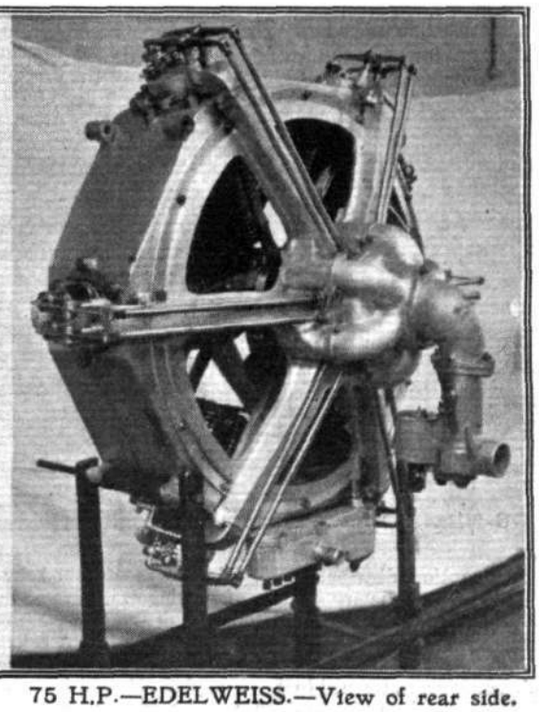
The magneto is driven by worm-gear off the crankshaft, and is fixed in a recess cast in the aluminium casing to which the pistons are attached. The crankshaft is supported in ball-bearings fitted to housings in the bosses of two spiders, one of which is fitted on each side of the engine. These spiders have circumferential flanges by means of which they are attached to the polygonal casing, whilst radiating arms connect the rim with the bosses. The arms on the rear side of the engine are permitted to act as conduits for the passage of the mixture between the carburettor and the inlet valves, and are therefore placed in communication with an inlet manifold in the centre of the engine, to which the carburettor—a Zenith—is attached.



75 H.P. EDELWEISS.—With end spider removed.



75 H.P. EDELWEISS.—View from front side.



75 H.P.—EDELWEISS.—View of rear side.

The oil reservoir is attached to the bottom of the casing, and

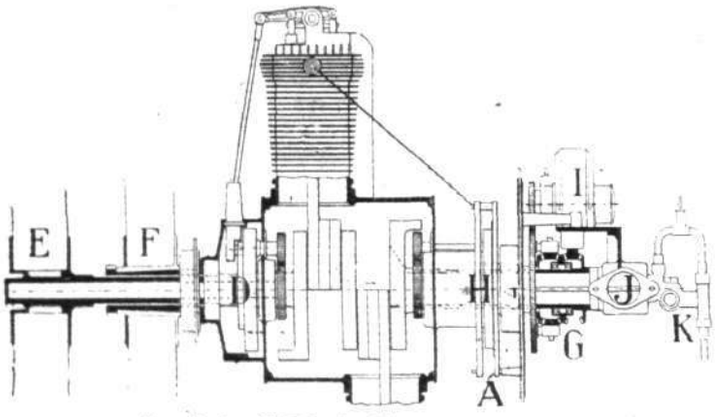
within this the lubricating pump is placed from which the separate leads to the pistons, &c., are taken. The timing gears and pump driving mechanism are enclosed in a chamber formed at the boss of the spider frame on the rear side of the engine and immediately in front of the inlet manifold.

It is claimed that by the adoption of the particular construction used in these engines the balance is made perfect, that the absence of troubles through overheating enables a higher efficiency and greater power to be attained, and all parts which are likely to require attention may be dismantled in a very few minutes. From the arrangement of cylinders and cranks which is employed the engines should be very smooth running, as the only unbalanced forces which are likely to exist are such as may be due to inequalities in the masses of the reciprocating parts, and these may also be eliminated by careful attention during manufacture. It will be observed that as the cylinders are all in the same plane there is no tendency to rock the engine in a plane through the axis of the shaft. The extremely effective cooling afforded to the cylinders by the passage of air over them, due to the translation of the machine as well as from their reciprocating movement, together with the cooling of the exposed portion of the piston during a portion of the stroke, will no doubt contribute greatly to the more efficient lubrication of the cylinders and pistons—namely those parts in which the greatest amount of power at present is wasted in the internal combustion engine. But whether the power developed and the efficiency attained will be greater than that of other types of motor can only be determined by experiment. The claim for accessibility would also appear to be well substantiated, because all the working parts are quite open and visible, even whilst running, and it would seem that their condition may be very readily examined during use.

E.J.C. Motors.

The 60 h.p. 6-cyl. rotary engine exhibited on this stand presents an interesting problem in relative motion, since the crank-shaft, as well as the cylinders, rotates, although in opposite directions. The construction employed is shown in the accompanying diagram, in which the propeller F is attached to the crank-case and the propeller E to the crank-shaft. The crank-shaft and the crank-case are each supported in roller bearings and function in the ordinary manner relative to one another; but since neither is fixed, the reaction from the piston due to the obliquity of the connecting-rod, causes the cylinder to rotate in an opposite direction to the crank—the relative speed depending solely upon the resistances offered by the air to the rotation of the propeller, cylinders, &c. In the type shown, the makers state the revolutions made by the crank-case are 800 per minute, and by the crank-shaft 1,200 per minute, giving a relative speed of 2,000 revolutions per minute.

Such a construction necessarily involves some complication in the valve timing and in driving the magneto, especially for the latter, which is fixed in position. As regards the timing of the cam-plate,



6-cylinder E.J.C. double rotary engine.

D, and high-tension distributor, H, this is accomplished by the introduction of two planetary systems of gearing as illustrated in the diagram, the required two-to-one reduction of the cam-plate being effected by the left-hand gear, whilst the plate marked A is kept in phase with the relative positions of the cylinders and crank-shaft by the planetary gear attached to it. The plate, H, which surrounds the shaft, is mounted on the crank-case, and carries the wires to the separate cylinders. The magneto, I, is driven from the crank-shaft by a sleeve through the double differential gear and spur wheels at G. On the sleeve is a bevel driving the pinion carried on the fixed support, which, in turn, drives the reversed pair of bevels, and these latter engage with two pinions supported by the large spur wheel that drives the smaller pinion on the armature shaft of the magneto.

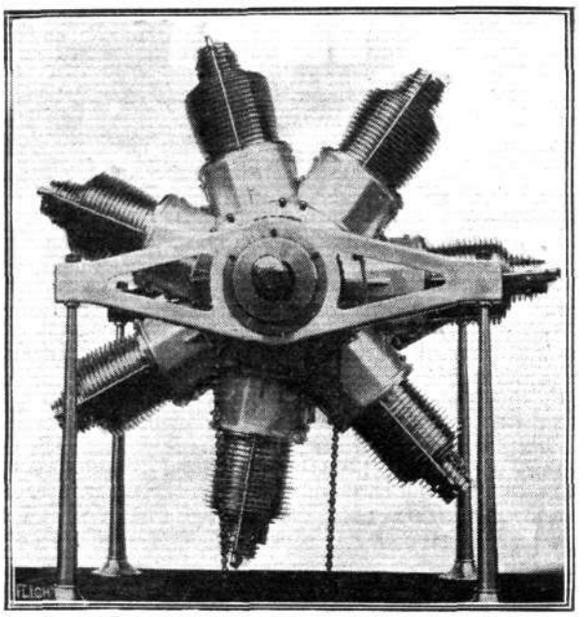
The carburettor is attached at J, and the mixture is fed through the interior of the crank-shaft to the crank-case and by radiating piping to the cylinders. Both valves are placed in the head, and are mechanically operated by a single push and pull rod controlled by the cam-plate. The lubrication of the cylinders and pistons is effected by a pump driven off the end of the shaft at K.

A ten-cylinder 100 h.p. engine of a similar type is shortly to be placed upon the market.

Esselbé.

The new 65 h.p. rotary engine is of more conventional design than the ingenious rotary engine which employed reciprocating pistons working in a circular cylinder seen at the 1912 Show. There is, however, still novelty in the construction adopted, in that the inlet is controlled by a sleeve valve and the exhaust by a piston valve. All the principal working parts of the engine, excepting the sleeve valve that controls the admission of the mixture to the cylinder, and which is of aluminium, are manufactured of high tension steel.

The general design of the engine is shown in the accompanying illustration, from which it will be observed that the cylinders are



65 h.p. 7-cylinder Esselbé engine.

attached to a heptagonal crank-case having cylindrical projections for the reception of the various cylinders, on each face. These cylinders all lie in the same transverse plane, and have two diameters, the smaller, within which the exhaust valve is placed, being at the outer end. The inner ends of the cylinders extend for some distance within the cylindrical chambers on the crank-case, and ports, through which the fresh gas passes into the cylinder, are cut through these extensions, the opening being controlled by the sleeve valve, which slides over them on the outside of the cylinder. The connecting rods, which are of rectangular cross section, suitably lightened, run on ball-bearings placed on a bush through which the crank-pin passes, and to which the two gear wheels for driving the magneto, pumps, &c., are also secured. These gear wheels—one on each end of the crank-pin—engage with pinions mounted upon the two steel plates used for closing the ends of the crank-case—the rear door being also fitted with passages leading to the gas chambers, as they are termed, at the inner ends of the cylinders. These radial passages are also placed in communication with the orifices cut in the surface of the hollow crank-shaft through which the gas is led from the carburettor in order to avoid the admission of the carburetted air to the interior of the crank-chamber.

A Bosch magneto is fitted, and oil is supplied to the connecting-rod ends, &c., by two independent pumps, each of which forces oil through separate leads through the crank-shaft.

The valves are operated through rods by means of two groups of seven eccentrics mounted on the crank-pin—two of each being for each cylinder. These rods are attached to the sleeve valve controlling the opening of the inlet ports, whilst two rods, which are placed radially on the two sides of the engine, make a rigid connection between the sleeve valve and the bridge, carrying the piston valve at its centre, as may be seen in the illustration. A close examination of the details of the smaller diameter of the cylinder will reveal the presence of a number of elongated holes, which constitute the exhaust ports, between the cooling fins.

The method of operation is as follows :—On the induction stroke of the cycle, the piston moves for some distance down the cylinder before uncovering the ports communicating with the gas chambers, but when the top of the piston reaches the edges of these ports, they are fully open and the gas rushes in at a high velocity owing to the high suction pressure existing in the cylinder. The exhaust valve closes the exhaust ports early in this stroke, and is still descending when the piston commences to return. On the return stroke, the piston first closes the inlet ports and then compresses the charge, which, when the dead centre is reached, is fired, and the piston moves foward on the power stroke of the engine. While the compression stroke is being made, the valve system commences to move towards the head of the cylinder, and by the time the piston again reaches the edge of the inlet ports on the power stroke, they are closed by the sleeve-valve. During the exhaust period, the valves continue to move outwards until the limit of their travel is reached, when they return and finally close the exhaust ports shortly after the piston has commenced the induction stroke. The sequence of operations is then repeated.

By means of the construction employed, the inlet valve is not subjected to the full pressure and temperature in the cylinder, and it is claimed that the troubles which are so frequently experienced in poppet valve engines are entirely eliminated.

(*To be continued.*)

⊛ ⊛ ⊛ ⊛

ARMCHAIR REFLECTIONS.

By THE DREAMER.

The Pilot-Instructor.

As a type, surely the pilot-instructor stands out peculiarly and splendidly alone. I can recall no other business or profession in which those called upon to instruct pupils have to work so long, who have more need of patience and less need of nerves, who take greater risks with less thought of them, than the pilot-instructor. At his best he is a splendid type of man, and worthy of every consideration by his employers. One has but to visit the aerodrome during lesson time, to realise that instructing pupils in aviation is work that calls for a man as instructor who must be no laggard. An early-riser, in the summer-time he must be at the aerodrome soon after four to take charge of his pupils during their early morning practice. First, he must thoroughly and personally test the machines and the air to see that everything is right; then he and his assistants—generally old pupils who have obtained their *brevets* and remain at the school—proceed to instruct the beginner. In most things it is but the commencement that is difficult, the rest following on by easy stages. But in learning to fly this is not so; the commencement is comparatively easy, the lessons not only getting more difficult as they progress, but the danger increasing. Quite new hands have the various parts of the machine and controls explained to them; others more advanced are taking their first experience of a run over the ground, or making a short flight as a passenger. Some still more advanced are making straight flights a few feet above the ground, landing at the far side of the aerodrome to taxi the machine round and fly back. These are generally under the supervision of the assistant-instructors, the chief or pilot-instructor having more arduous and responsible work on hand; he is up in the air as a passenger, sitting behind or alongside an advanced pupil who has sole control of the machine, possibly for the first time.

This sounds a risky thing to do, but it has to be done sometime with all the pupils, and at some of the larger schools, having always a great number of pupils on hand, has to be done a dozen times a day. If passengers at Hendon or Brooklands ever have any qualms about going up behind a fully-qualified pilot, what must that pilot feel like when he goes up, as he does many times every day, year in and year out, behind novices? It is true that some machines have dual control, but many have not; and even where such is fitted it is by no means certain that a pilot will be able to correct the mistake of a pupil. In cases of urgent decision as to what to do, when seconds are precious, it is almost impossible that any two people, even when they are both pilots, will do the same thing at the exact moment; how very much more so is this unlikely when one is an unskilled pupil, likely to lose his head just at the time when he most needs to keep it? In this many-sided business, flying as a passenger on a machine under the control of a pupil calls for more pluck than is generally possessed by the average man. At breakfast-time, when the wind begins to gain strength, the pupils have finished till evening, unless it happens to be a very still and favourable day, when practice may go on throughout the entire day. For the pilot-instructor, however, there is no rest. In addition to instructing, he generally has also the management of the teaching side of the business, and must keep a log of all lessons and flights made by his pupils, which have to be entered up and progress noted every day.

Machines have to be overhauled and inspected to locate minor defects, and it is surprising what a lot of small damage a machine sustains when used for tuition purposes—damage which is sometimes very hard to detect, but which may lead to a very effective smash during landing later on, if not discovered and rectified.

Instructions have to be given to the mechanic to "put this right," or "strengthen that," and quite a lot of time and care is expended over this part of the business.

During the afternoon, on several days in the week, the pilot-instructor at some aerodromes must become an exhibition flyer, and provide interest and amusement for the paying public; taking part in races and doing his best to win prizes for his employers. On these days he must also be ready with his machine to take up passengers, passenger-flights continuing in the summer-time right up to dark. On other days evening school is held, and again he has not finished till long after most other people have returned home to dinner and rest.

New machines, often of a type never tried before, have to be tested, and if they will fly at all, have to be flown in order to demonstrate the success or failure of some new idea; and at such work the pilot-instructor becomes hardened to minor smashes, such as a machine falling a few feet and breaking a wheel or strut, often pitching the pilot out with more speed than ceremony.

Nowadays it is also not at all an uncommon thing for a pilot to have to travel to the Continent to take charge of, and deliver by way of the air, a new machine of a type on which he has never flown before. Cross-Channel flying, once so wonderful, is now taken as part of the day's work.

Again, personality plays a great part in the making of a successful instructor. Pupils will learn rapidly under a man of charming personality, who would perhaps be slow under another man. An instructor who can make his pupils feel that he has a genuine interest in their progress, and can smile good-naturedly at their feeble attempts, meanwhile fostering them with words of encouragement, not only makes learning a pleasure, but benefits both the pupil and the school by obtaining the precious *brevet* in the shortest possible time without sacrificing thoroughness.

In after years it must be a source of great pleasure to him when one or other of his old pupils does something of note in the world of aviation; as he can then say with all justifiable pride, "I taught him to fly."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL DINNER.

THE ANNUAL DINNER will take place at the ROYAL AUTOMOBILE CLUB, PALL MALL, LONDON, S.W., (by kind permission) on FRIDAY, FEBRUARY 27th, 1914, at 7.30 for 8 o'clock.

In order to facilitate the arrangements, Members are requested to notify the Secretary as early as possible, if it is their intention to be present.

Members may be accompanied by Ladies.

Tickets (exclusive of Wines and Cigars) 12*s.* 6*d.* each.

The following presentations will be made during the Dinner.

Britannia Challenge Trophy to Capt. C. A. H. Longcroft, R.F.C.

British Empire Michelin Trophy No. 1 and £500 to Mr. R. H. Carr.

The Marquess of Tullibardine, M.V.O., D.S.O., M.P., the Chairman of the Club, will preside, and The Rt. Hon. Winston S. Churchill, M.P., First Lord of the Admiralty, has honoured the Club by accepting its invitation.

Committee Meeting.

A meeting of the Committee was held on Tuesday last, February 3rd, 1914, when there were present: Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Griffith Brewer, Mr. E. C. Bucknall, Mr. G. B. Cockburn, Major J. D. B. Fulton, C.B., R.F.A., Mr. Mervyn O'Gorman, C.B., Mr. C. F. Pollock, Com. C. R. Samson, R.N., Mr. T. O. M. Sopwith, Mr. R. W. Wallace, K.C., and the Secretary.

New Members.—The following new members were elected:—Capt. R. K. Bagnall-Wild, R.E., Arthur Charles Bonsor, H. S. W. Eyre, and John Clifford Savage.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

727 Com. Mansfield Cumming, R.N. (Maurice Farman Biplane, Etampes). Nov. 10th, 1913.

728 Frederick George Dunn (Blériot Monoplane, Blériot School, Hendon). Jan. 23rd, 1914.

729 Herbert Ambrose Cooper (Caudron Biplane, Ewen School, Hendon). Jan. 27th, 1914.

730 Lieut. Marmaduke Henry Monckton, R.A. (Vickers Biplane, Vickers School, Brooklands). Jan. 28th, 1914.

731 Edward Fraser Norris (Grahame-White Biplane, Grahame-White School, Hendon). Jan. 28th, 1914.

Aeronaut's Certificate.—The following Aeronaut's Certificate was granted:—

38 John L. Weston.

Airship Pilot's Certificate.—The following Airship Pilot's Certificate was granted:—

23 John L. Weston.

Accidents Investigation Committee.—On the motion of Col. H. C. L. Holden, the report on the fatal accident to Mr. George Lee Temple was unanimously adopted.

(Full report will be found following these notices.)

Annual Dinner.—It was decided to hold the Annual Dinner at the Royal Automobile Club on Friday, February 27th, 1914. The arrangements were left in the hands of the House Committee.

Accidents Investigation Committee.

A meeting of the Accidents Investigation Committee was held at the Royal Aero Club on Wednesday, January 28th, 1914, at 8.30 p.m., when there were present:—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. A. E. Berriman, Eng.-Lieut. E. F. Briggs, R.N., Mr. G. B. Cockburn, Major J. D. B. Fulton, C.B., R.F.A., Mr. J. H Ledeboer, Mr. W. O. Manning, Mr. Mervyn O'Gorman, C.B., and the Secretary.

Fatal Accident to Mr. George Lee Temple.—The Committee proceeded to inquire into the accident which took place at the London Aerodrome, Hendon, N.W., on Sunday, January 25th, 1914.

The following gentlemen attended and gave evidence:—Mr. W. G. Beatty, Mr. N. Chereau, Mr. R. T. Gates. Mr. A. B. Leakey, M.B., Mr. Louis Noël, and Mr. F. Handley Page.

The Committee proceeded to draw up its report, which appears elsewhere in these notices.

International Races.

The attention of Aviators and Manufacturers is particularly drawn to the following notices regarding International Races:—

THE JACQUES SCHNEIDER MARITIME AVIATION CUP AND PRIZE, 25,000 FRS.

Mr. Jacques Schneider has given a trophy of the value of 25,000 francs and a cash prize of 25,000 francs for three years for international maritime aviation competition.

Each club affiliated to the Fédération Aéronautique Internationale has the right to challenge the holder, the Aero-Club de France, and such challenge must be sent in before March 1st, 1914.

The Committee of the Royal Aero Club will select three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before Tuesday, February 24th, 1914, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

Regulations for 1914.

(Translation from the French.)

The distance to be accomplished for the Jacques Schneider Maritime Aviation Competition in 1914 is 150 nautical miles.

The Competition will take place exclusively at sea on a closed circuit having a minimum course of 5 nautical miles and situated outside any port or closed harbour. Alightings are permitted.

Competitors may start at any time they wish between 8 a.m. and the official hour of sunset. Only one attempt is allowed, and before starting a competitor must notify the officials of his intention to take part in the Race. Two copies of the final regulations will be handed to all contestants, and one copy of these regulations, signed as approved, must be handed by the competitor to the official before starting in the competition.

The competitor will then navigate his machine over the line of departure, rise, and make a tour of the course with at least two alightings on the water at points indicated by the officials. This having been accomplished, he must proceed without alighting to make the first lap of the circuit, clearing the line of departure in full flight. He must then continue the course until the whole distance has been completed, when the arriving line must be passed in full flight and the alighting made on the course.

The Race will take place at Monaco on April 20th, 1914.

The following entry has been received:—

Sopwith Aviation Co., Kingston-on-Thames.

GORDON-BENNETT AVIATION CUP.

Rules for 1914.

The Race for the Gordon-Bennett Aviation Cup will take place in France this year.

The Race will be over a distance of 200 kilometres on a course having a minimum distance of 5 kilometres.

Competing aircraft, before taking part in the Race, will have to pass the following preliminary test:—

A flight in a straight line out and back of about 2 kilometres, without touching the ground, at a constant height of not more than 30 metres. The speed of the test shall be the mean of the speeds of the flights out and back, which must not exceed 70 kilometres per hour. In this test the aircraft must carry sufficient petrol and oil to cover the whole course of 200 kilometres. Three attempts will be allowed to each competitor.

After the qualifying tests have been passed, no modifications may be made to the aircraft. Repairs will only be allowed with the permission and under the control of the Officials.

Each club affiliated to the Fédération Aéronautique Internationale has the right to challenge the holder, the Aero-Club de France, and such challenge must be sent in before March 1st, 1914.

The Committee of the Royal Aero Club will select the three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before Tuesday, February 24th, 1914, of their willingness to compete if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

The following entries have been received:—

A. V. Roe and Co., Manchester.

Sopwith Aviation Co., Kingston-on-Thames.

166, Piccadilly, W. HAROLD E. PERRIN, Secretary.

ACCIDENTS INVESTIGATION COMMITTEE OF THE ROYAL AERO CLUB.

REPORT No. 19.

REPORT ON THE FATAL ACCIDENT TO MR. GEORGE LEE TEMPLE WHEN FLYING AT THE LONDON AERODROME, HENDON, LONDON, N.W., ON SUNDAY, JANUARY 25TH, 1914, AT ABOUT 4 P.M.

Brief Description of the Accident.—Mr. George Lee Temple was flying a Blériot monoplane, fitted with a 50 h.p. Gnome motor, at the London Aerodrome, Hendon, London, N.W., on Sunday, January 25th, 1914, at about 4 p.m. He had been in the air ten minutes, and had reached a height of approximately 500 ft. He then descended to about 150 ft., after which he flew horizontally for some 200 yds. During the descent he was heard to switch his engine on and off. At the end of the horizontal flight, the engine was heard to cease firing, and the aircraft thereupon dived as if the pilot intended to make one of his usual steep descents, prior to landing. Instead of flattening out, however, the aircraft progressively turned over beyond the vertical and alighted on its back. The pilot was found strapped in the seat and clear of the ground. When released from the machine, the pilot was dead, and his neck was found to be broken.

Mr. George Lee Temple was granted his Aviator's Certificate No. 424, on February 18th, 1913, by the Royal Aero Club.

Report.—The Committee sat on Wednesday, January 28th, 1914, and received the report of the Club's representative, who was present at the time of the accident. Evidence was also given by eye-witnesses of the accident, and the medical officer who made the post-mortem examination.

From the consideration of the evidence, the Committee regards the following facts as clearly established :—

(1) The aircraft was built early in 1912.

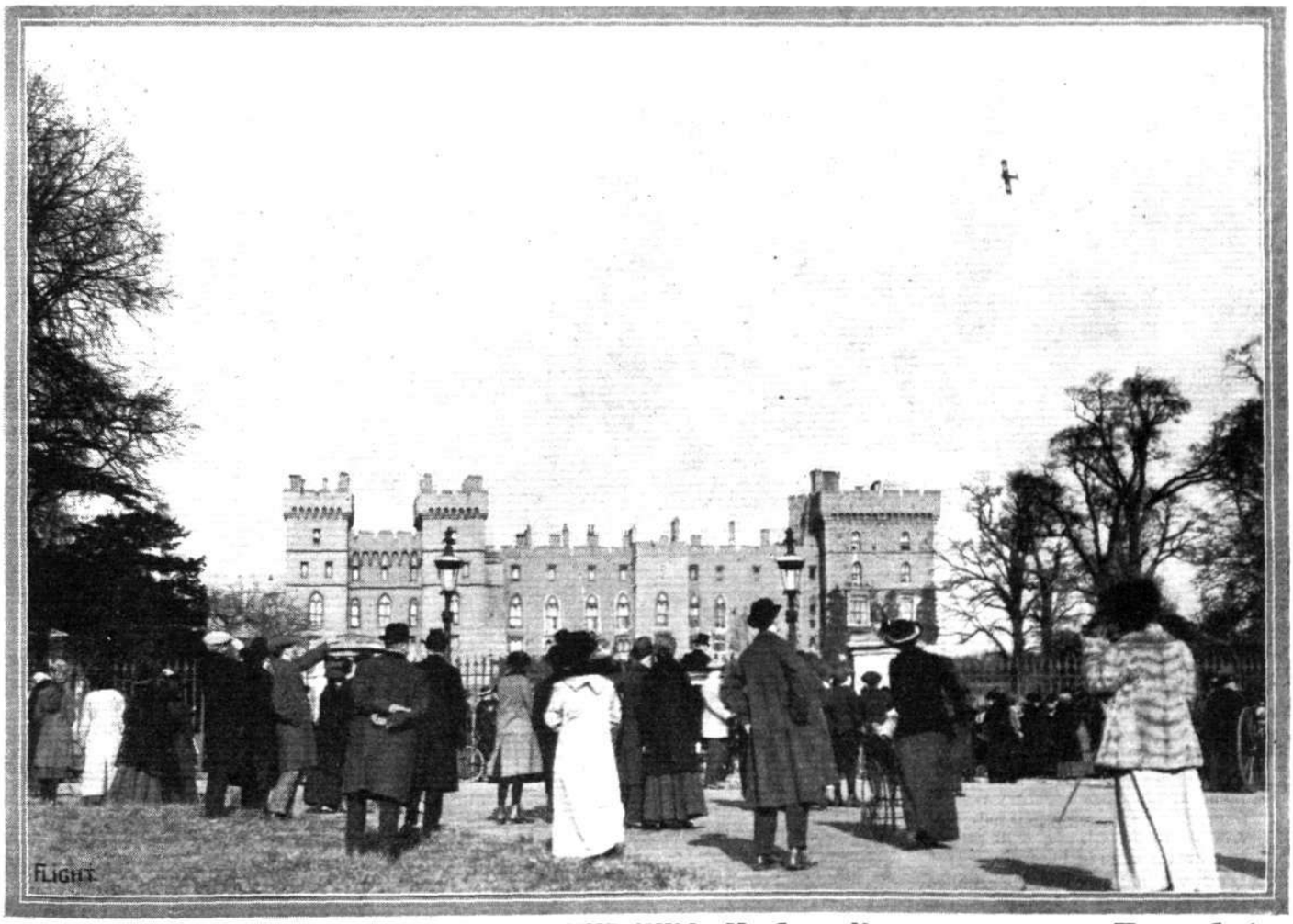
(2) All the controls were in working order.

(3) The then state of health of the pilot as disclosed by the post-mortem examination was such that he incurred grave risk by flying at all. The evidence of the doctor who examined the pilot and subsequently carried out the post-mortem was to the above effect. The doctor also stated that the pilot's neck was broken in such a manner as to indicate that the neck muscles were relaxed at the moment of breaking, pointing to the probability that the pilot was unconscious at that time.

Opinion.—The committee is of opinion that the condition of the pilot's health, as disclosed by the medical evidence, coupled with the fact of the gradual turning over of the aircraft in its descent to the ground, point to the pilot having lost consciousness just before or at the commencement of the dive, and that this loss of consciousness and control was the cause of the accident.

Mr. Hamel Flies Before the King.

HAVING received a command to give an exhibition before Their Majesties the King and Queen, Mr. Hamel flew from Hendon to Windsor on Thursday of last week, arriving at the Castle at about 12.45 p.m. After flying for about ten minutes over and round the Castle, Hamel alighted on the East Terrace. He was presented to Their Majesties, and the King and Queen inspected the machine. The Royal party included Princess Mary, Prince Henry and Prince John. The news of Mr. Hamel's intended visit leaked out, and a large crowd gathered within the Castle grounds and at other vantage points. Mr. Hamel had the honour of an invitation to luncheon at the Castle. At 2.30 p.m. he was again in the air giving a demonstration of high flying before Their Majesties, and half an hour later he disappeared in the direction of Hendon ; and upon this occasion Mr. Hamel did not loop the loop, but this part of the programme was carried out during another visit to Windsor on Monday. A few minutes after twelve Mr. Hamel arrived on his 80 h.p. Morane-Saulnier machine and *vol planéd* down to the East Lawn, where Their Majesties the King and Queen, with the Princess Royal, Princess Maud and Prince John were waiting. At 12.30 p.m. Mr. Hamel ascended again, and in the course of a 17-min. flight made fourteen loops. After luncheon at the Castle Mr. Hamel gave another display of looping before returning by the air-way to Hendon.



LOOPING THE LOOP BY COMMAND OF THE KING.—Mr. Gustav Hamel upside down over Windsor Castle before the King on Monday. Our photograph shows the spectators watching the evolutions from the Long Walk.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Naval Flying.—On Monday, last week, a thick fog prevailed. Mr. Kemp made two short flights on a new BE 70 Renault, built by Messrs. Hewlett and Blondeau. Although this was the first time the machine had been up she flew well.

Tuesday again there was fog. Mr. Kemp was up again on BE, flying well nearly all morning. In the afternoon Lieut. Briggs was on Blériot 39 making numerous flights lasting till nearly dusk. Lieut. Rainey took up Dep. 36 and made one fine long flight, handling his machine nicely, and making well banked turns.

Wednesday saw all pilots up. Lieut. Pierce on S. 65 with Lieut. Clarke Hall. Lieut. Osmond with Lieut. Ireland on S. 64. Lieut. Collett on Avro 41 for two short flights. Capt. Kilburn on S. 63. Lieut. Marix on Sopwiths 27 and 104, making a long flight on each. Lieut. Davies on the new BE biplane, two good flights. Asst.-Paymaster Finch Noyes numerous short flights on H. Farman 31. Lieut. Rainey a flight on S. 63. Lieut. Briggs flying on Blériot 39. Capt. Courtney on S. 63, and also on H. Farman 31.

Thursday was again a busy day in spite of a very tricky wind. Com. Samson made some good flights on S. 10. Asst.-Paymaster Finch Noyes numerous short flights on H. Farman 31, Lieut. Marix flying well on Sopwith 104, taking Sub-Lieut. Fowler for a long trip. Lieut. Littleton on Avro 16 and M. Farman 70. Capt. Courtney some good flights on S. 63. Lieut. Collett on Avro 41. M. Farman 70 and S. 65 were taken up by different pilots. Lieut. Osmond on S. 28. Lieut. Briggs made an excellent flight on the Blériot 39.

Friday there was an absolute gale, and only Lieut. Pierce was up on S. 65.

Saturday was very windy, Lieut. Rainey up with Telegraphist Sparks as passenger on S. 64. Lieut. Edmonds on S. 28. Lieut.

Mr. Edward Fraser Norris, who passed for his Royal Aero Club pilot tests at the Grahame-White School on a G.-W. biplane last week. Mr. Norris is just eighteen years and two months old.

Marix piloted the Sopwith 104 for a long cross-country flight accompanied by Lieut. Osmond. Comr. Samson made a long flight on S. 10.

Civilian Flying.—On Tuesday last week, Mr. Gordon Bell up on the Short tractor 100 h.p. Gnome. After making a short circuit of the aerodrome he flew the machine to the Naval Station at the Isle of Grain.

Mr. Raynham visited Eastchurch on Thursday on the latest Avro 80 h.p. Gnome from Brooklands. Coming down for a short rest and a refill of petrol, he then made a fine show of banked turns and flying at low speed. He was flying as smoothly and as flat as though he were running all out. After a little more trick flying he returned to Brooklands. On Saturday, Mr. Gordon Bell was up for two or three good high flights on a new Short tractor 100 h.p. Gnome, taking Mr. Fairey as passenger.

Brooklands Aerodrome.

FULL advantage was taken on Monday, last week, of the fine weather (the wind not registering more than 12 m.p.h.) by the Bristol and Vickers schools both morning and afternoon. In the morning Mr. Barnwell was out on the Vickers gun-carrier, on which he flew over to Farnborough, leaving the machine there in readiness for a test the next day. Messrs. Elsdon, Webb and Hinshelwood were flying respectively on the No. 5 Vickers monoplane. In the afternoon, Herr Roempler made a number of flights, both solo and with passengers. Mr. Knight and Mr. Hinshelwood were out on the No. 5 Vickers monoplane.

On Tuesday the weather was again good, both the Vickers and Bristol schools being busy in morning and afternoon. In the morning, Mr. Raynham (with Mr. Toop as a passenger) flew over to Hendon on the 80 h.p. Avro biplane. Herr Roempler made a number of solo flights, afterwards taking a passenger up to an altitude of 1,000 ft. In the afternoon Mr. Raynham returned from Hendon at a height of 4,500 ft., descending in spirals with engine shut off and making a good landing in front of his shed. Mr. Elsdon was out on the No. 5 Vickers monoplane, on which machine Messrs. Webb and Hinshelwood made some flights, the latter at 1,000 ft. Mr. Raynham made some good solo flights on the 80 h.p. Avro.

The weather was less favourable Wednesday, the wind blowing up to 21 m.p.h., but good work was done by both the Vickers and Bristol schools. Mr. Vincent Waterfall was flying well for about half an hour on the Martinsyde monoplane. Mr. Hamel, with his manager, Mr. W. E. de B. Whittaker as a passenger, arrived from Hendon on his Morane-Saulnier monoplane, on which he gave some fine exhibition flights. Mr. Barnwell was flying solo and with a passenger on a Vickers biplane. Mr. Monckton passed his *brevet* tests in good style on a Vickers biplane, rising to 500 ft. in the altitude test.

On Thursday the wind was a little stronger, attaining a velocity of 23 m.p.h. Mr. Barnwell was on a Vickers biplane. The crankshaft of Mr. Hamel's Morane-Saulnier monoplane having given trouble, Mr. Raynham took him as a passenger on the 80 h.p. Avro to Hendon to borrow Mr. Grahame-White's 80 h.p. tandem Blériot, in order that Mr. Hamel might fly to Windsor, whither he had been "commanded" to give a flying exhibition before His Majesty the King. Ten minutes only was taken for the trip to Hendon by Mr. Raynham on the 80 h.p. Avro biplane, Mr. Raynham returning alone to Brooklands, and afterwards flying with his mechanic, F. G. Clifton, to Eastchurch, this journey only taking 35 mins., or at the rate of 108 m.p.h., a splendid performance reflecting the greatest credit on pilot and machine alike. Mr. Raynham returned from Eastchurch alone. Mr. Dukinfield Jones was testing the Isaacson engine of his Flanders biplane.

The force of the wind varied on Friday up to 32 m.p.h., and only two machines were out, Mr. Barnwell with a pupil as a passenger on a Vickers biplane, and Mr. Dukinfield Jones for several circuits on his Flanders biplane. Mr. Sidney Sippe arrived at the Bristol school to take charge in place of Mr. Merriam, whose many friends will sympathise with him in his accident, from which he is gradually recovering, but which will necessitate a few weeks' rest.

On Saturday, Mr. J. Alcock was testing the Sunbeam engine, which had been dismantled and overhauled, and was found to be running well up to expectations, on Mr. Coatalen's Maurice Farman biplane. Mr. Raynham made a number of good flights on the 80 h.p. Avro.

On Sunday the wind was fresh and bumpy, only 3 machines being out. Mr. Raynham was first to test the strength of the wind, quickly climbing to an altitude of 4,000 ft., the machine drifting backwards owing to Mr. Raynham incessantly switching the engine on and off, thus affording a very fine spectacle in the air. In the ballot for the free passenger flights, a second draw was necessary owing to no claimant putting in an appearance at first, the ultimate winner being Miss Mather, of Lunesdale, Beckenham, whom Mr. Raynham took up to an altitude of nearly 2,000 ft. on the 80 h.p. Avro biplane, a splendidly judged landing being made in front of the shed. Mr. Dukinfield Jones made a number of circuits on his Isaacson engined Flanders biplane, and Mr. Pixton was busy testing a 100 h.p. Green engine on a Sopwith biplane.

During next week Mr. Sippe expects delivery of an 80 h.p. (old type) Bristol tractor biplane, which he will use for the next fortnight until the arrival of an 85 h.p. Gnome-engined biplane of the up-to-date type. Two new Sopwith biplanes are also expected.

Bristol School.—Halford made two test flights, Monday, last week, and then took Air-Mechanic Locker for several flights, pupil having complete control. Mr. Racine-Jacques made three solo flights, after which Halford gave him tuition in *vol plané* landings. Halford gave three more tuition flights to Air-Mechanic Locker. In the afternoon, Halford made a test flight with Air-Mechanic Locker as passenger, following which Mr. Racine-Jacques took over the machine and practised landing. Halford then took up in succession Lieut. Ames (three flights), Air-Mechanic Locker (three

flights) and Lieut. Fraser (once), all pupils sitting in the pilot's seat practising landings. Mr. Racine-Jacques finished the day's work by making a very fine solo flight.

The strong wind Tuesday morning prevented any flying, but dropping during the afternoon Halford gave two tuition flights to Lieut. Lawrence, while Mr. Racine-Jacques flew two solos. Halford then went up with Air-Mechanic Locker and Lieut. Lawrence, dusk preventing any further flying.

Wednesday, Halford first tested conditions, when the fog had cleared, taking Air-Mechanic Locker as passenger, then giving this pupil tuition on straights and landings, after which he flew for numerous straights, showing good judgment. Halford sat behind Lieut. Lawrence on three flights, and Mr. Locker made two more solos. Halford gave passenger tuition to Lieuts. Ames and Lawrence, but the strong wind prevented any more flights being made.

Thursday, Friday, and Saturday too windy for tuition.

Vickers School. — Monday, last week, Instructors Barnwell, Knight, and Elsdon on biplanes with Lieuts. Prichard, Monckton, and Crosbie and Mr. Hurst. Lieut. Monckton solo. Messrs. Hinshelwood and Webb solos on No. 5 mono. Mr. Creagh solo on biplane. On Tuesday, Knight and Elsdon on biplanes with Lieuts. Crosbie and Prichard, and with Messrs. Creagh and Hurst. Lieut. Monckton solo. Messrs. Webb and Hinshelwood on No. 5 mono. Barnwell on biplane with Lieut. Crosbie and Mr. Creagh.

Knight and Elsdon on biplanes with Lieuts. Prichard and Crosbie Wednesday. Lieut. Monckton on biplane for *brevet*, getting through in good style. Barnwell with Lieut. Lee-Jackson (new pupil). Mr. Creagh solo circuits on biplane. Knight with Lieut. Lee-Jackson.

Thursday and Friday, Barnwell on biplane with Capt. Ross Hume (new pupil) in bumpy wind.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, Messrs. Cripps, Lillywhite, Norris, Bjorkland, solo circuits, spirals, &c. Messrs. Eldridge-Green, Graham, Parker, Lindop, Barrs, Moore, straights with Instructor Manton in passenger seat.

Tuesday, Messrs. Moore, Parker, Cowley, Eldridge-Green, Graham, Barrs, Piercy, Lindop, straights with Mr. Strange in passenger seat. Messrs. Carr, Norris, Cripps, Lillywhite and Bjorkland solo circuits, figures of 8, &c.

Wednesday, Messrs. Piercy and Graham straights with Mr. Strange in passenger seat. Messrs. Lillywhite, Bjorkland and Norris, circuits, &c. Mr. Norris afterwards going in for and passing *brevet* tests—he is presumably the youngest certificated pilot, being 18 years and 2 months old.

Blériot School.—Last week, after several good flights, Capt. D. Burdett successfully passed all "Certificate" trials except altitude, having to stop on account of late evening and darkness setting in.

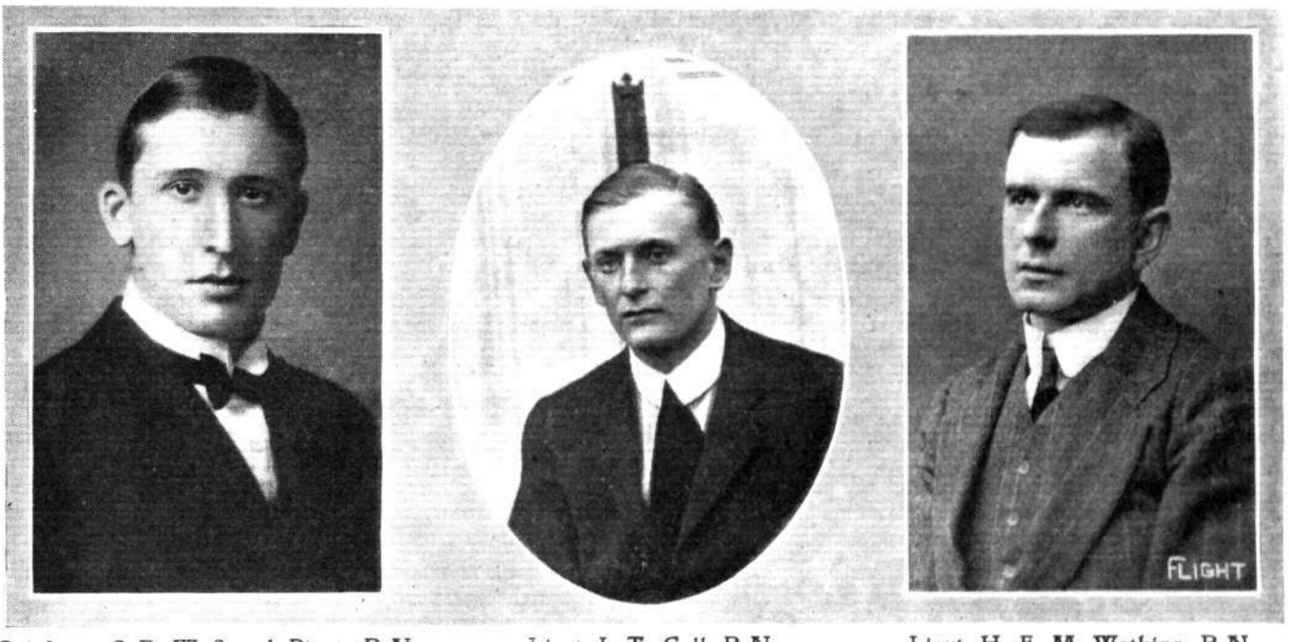
Mr. E. Gower, certificated pilot, made several practice flights during the week. Instructor: Mr. Jules Teulade.

W. H. Ewen School.—On Monday last week school was out at 8.30 a.m. Test flight by M. Baumann on *brevet* machine. Mr. Cooper then did circuits and figures of eight, and Mr. Murray circuits and landing practice. On 35 h.p. Caudron No. 1, Mr. Goodden instructing, Mr. Garvin was rolling, and Mr. Bankes-Price did straights. During afternoon, after test flight by M. Baumann, on *brevet* machine, Mr. Cooper went through the first half of his *brevet* tests, flying high and very steadily.

At 10.30 a.m. on Tuesday Mr. Goodden was making a test flight on 35 h.p. Caudron No. 1, after which Mr. Bankes-Price did straights and Mr. Garvin rolling practice. At 3.15 p.m. Mr. Cooper went through his altitude test for the R.Ae.C. certificate, reaching 700 ft. and making a good *vol plané* with an excellent landing. Mr. Goodden also out with 35 h.p. Caudron No. 1, Mr. Garvin rolling and short flights.

During the rest of the week the weather was not favourable for school practice.

Hall School.—Monday last week, in morning, H. Gering as passenger studying controls on Avro at 1,600 ft. In afternoon, Messrs. Gering, D'Arcier and Brookes on No. 2 Caudron doing several straights each. All getting on well. Later H. Gering good hops.



Sub-Lieut. S. R. W. Smyth Pigott, R.N. Lieut. J. T. Cull, R.N. Lieut. H. E. M. Watkins, R.N.
Three more pilots who have recently taken their Royal Aero Club certificate at the Bristol Brooklands School under the tuition of Mr. Merriam.

Denys Ware left school Tuesday to fulfil his military duties at Farnborough. Messrs. A. Brookes, H. Gering and D'Arcier out on No. 2 Caudron, three straights each. H. Gering making good progress, leaving ground on several occasions. In afternoon, A. Brookes, D'Arcier and H. Gering three straights apiece, the former two with tail well up, and the latter hops.

Gering did good straight alone Wednesday, then Messrs. D'Arcier two straights, Brookes one and Gering one. Wind prevented any further practice.

Thursday, J. L. Hall exhibitions on Avro in strong wind at 2,000 ft. Friday gale.

Saturday, school closed as a mark of respect for the funeral of the late G. L. Temple.

Sunday, gale.

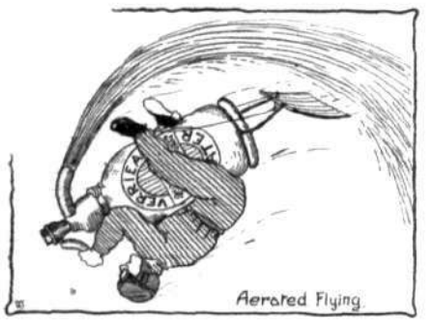
Salisbury Plain.

Bristol School.—Monday, last week, after test flights had been made by Jullerot, Mr. Tod went for a solo on the monoplane. Merriam then gave tuition to Capt. Wallcot on landings, afterwards taking Mr. Stutt, this pupil having complete control. Merriam then took Capt. Wallcot for a trip in the tractor biplane, during which Voigt gave tuition to Mr. Stutt (three flights) and Capt. Wallcot (two flights). In the afternoon Voigt again took Mr. Stutt for a long cross-country flight, while Jullerot gave tuition in *vol planés* and landings to Capt. Wallcot.

The strong wind prevented any tuition being given on Tuesday, whilst Wednesday, Thursday, Friday and Saturday, no tuition was possible owing to the high winds and rain.

EDDIES.

I AM not one to walk in fear and trembling for the welfare of a great industry because someone claims to have invented a contrivance that is going to knock the whole thing into the *Ewigkeit.* It is natural that in a new business like flying, great men will arise from time to time and evolve ideas that will simplify or make more safe the heavier-than-air machine; but in my blind conservativeness I adhere to the opinion that for quite a long time to come flying will be carried out mainly by the aid of wings, engine and propeller, arranged very much as in the present types of aeroplanes. To make an aeroplane fly without an engine or propeller and be safe in bad weather is the aim of Mr. K. de Proszynski, according to the *Daily Mirror.* This gentleman says flying is too easy, and that is why we have so many fatal accidents. I don't quite see myself how, if it is going to be harder to fly under the new principle, it is also going to be more safe. If it is harder, it seems to me that there will be more likelihood of making mistakes, and mistakes generally lead to accidents.



According to my source of information, Mr. Proszynski has said that within three months he will produce an aeroplane without engine or propeller, and will give a flight demonstration with it on a flying ground near London.

"The apparatus takes the form of a large cylinder that contains petrol, gas, and air. Apart from this cylinder and the petrol tank there is no machinery of any kind, with the exception of a mechanical arrangement to increase or decrease the issue of gas to rise or descend, and increase or decrease the speed. There is no steering gear, the steering being done by means of the valves in the cylinder. The action of the cylinder also secures stability for the aeroplane by creating an artificial air cushion."

If we are to progress on these lines, I can see the day, not far off, when a pilot will loop the loop on a syphon of soda-water.

× × ×

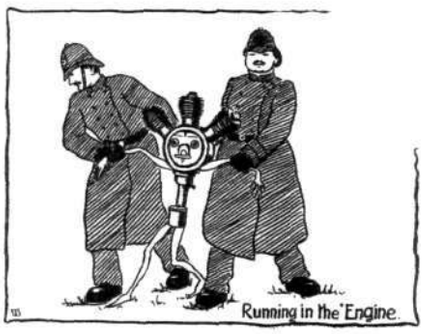
At a meeting of the Bridlington Town Council recently a petition was received from the local clergymen and ministers referring to the proposed flying exhibitions at Bridlington during the coming summer. The petitioners requested, in the interests of religion and morality, "that a clause should be entered in the agreement that there should be no flying on Sundays under any circumstances." The petitioners felt confident that the Council would comply with their request, "especially with a view to the protecting of our young people from the moral perils of Sabbath desecration." I take no side with regard to Sunday flying. I have my own opinion on the matter; but if any towns feel that they do not wish it to take place in their vicinity they have every right to do their best to prevent it. I do, however, like consistency in things of this description. If the powers that be in Bridlington are so conscientious that they take objection to Sunday flying for the reasons that they put forth, I take it that they are people who wish to influence the young people to lead entirely upright, straightforward lives, and to do nothing that would prevent them looking back on their past lives and saying they had always done the right thing according to their light. It is simply the principle of the thing that I am concerned with. It would be interesting to learn how these good people of Bridlington can reconcile the above with the following.

"The Parliamentary Committee recommended the appointment of a local man as building inspector. Mr. Stuart, a member of the committee, said a Halifax applicant had the best credentials and would probably have been appointed had it not been for political, or chapel, or outside influences. He said that as a Liberal, and the majority of the committee were Liberals. How could they criticise their opponents if they acted as the resolution recommended?"

That's right! Mr. Stuart, if your big men are going to take unto themselves pedestals, let them be worthy.

× × ×

It is strange, even in these days of knowledge of matters aeronautical by the general public, what queer things one sometimes overhears at aerodromes. At Hendon the other day Marty was giving his engine a warm-up at the far end of the enclosure, and as usual there was a rush to the spot. The usual racket and clouds of smoke followed, but meanwhile nothing could be seen of the machine owing to the crowd of people standing round. One lady, evidently much concerned, asked her companion what was the matter, and on being told that it was only somebody "running his engine in," failed to grasp what was meant, but appeared to have thoughts of a running-in of quite a different nature. By the way—I wonder why it is that so few of our pilots give their engine a little turn now before starting away. The general rule now seems to be to come out, swing the propeller and mount at once. I suppose it is all right; but—now that most pilots do what at one time was only done by Hamel, that is, to start a banked turning climb immediately on getting off—if an engine did happen to hesitate, there might be trouble.



× × ×

At Hendon, on Saturday last, I heard that cheerful optimist, the megaphone man, make an announcement I had not heard for a very long time: that, owing to the high wind, the speed contest could not be held. It used to be a quite familiar announcement during 1912; but it takes a good deal of wind to stop pilots now. Nevertheless, Saturday was not a day fit for flying at all, and it was quite right to withhold the contest. Yet it sounded rather peculiar for him to announce, practically in the same breath, "passenger flights can now be booked." I don't know that many passengers took advantage of the gale to gain some experience of flying in rough weather; I only saw one go up with Noel, and that might have been a joy-ride. Whether or no, in this particular instance there was quite enough thrill in it for those looking on from the ground. Noel taxied out and turned to face the wind and the sheds. Why the machine would not climb better it was difficult to judge, but he had quite a job to get her much above the sheds. Meanwhile she was drifting horribly, and canted and rolled about in a way not pleasant to see. A sudden left-hand

turn with the wind resulted in a ghastly downward side swoop, and the machine was quite near enough to the earth when Noel was able to flatten out and set her to climb again, which, for some unaccountable reason, she did better with the wind than against it. If the passenger was out for thrills he was not disappointed, if he knew enough to realise it. The blowing over of Marty on the Morane-Saulnier immediately on leaving the ground showed the strength of the wind.

"WILL O' THE WISP."

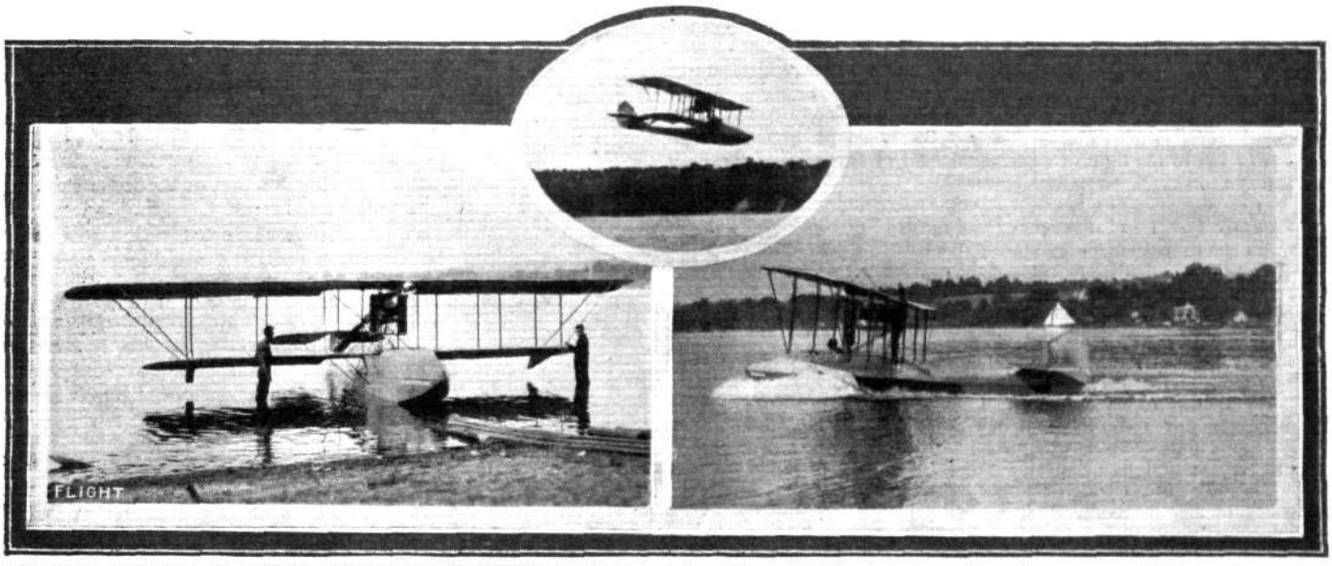
THE THOMAS FLYING BOAT.

DURING the past season the Thomas Brothers Aeroplane Co., of Bath, N.Y., turned their attention to the construction of flying boats with marked success. The biplanes produced by this company in the past have held the American Endurance Record for pilot and passenger, and also the American altitude record for pilot alone (12,575 ft.). It should be noted that the machines used for these flights were standard models.

The flying boat, of which we publish illustrations herewith, has been flown extensively with great success, and has, in the hands of Mr. Walter E. Johnson, chief pilot of the Thomas Brothers Aeroplane Co., proved successful as a pleasure craft for use on inland waters. Mr. Alfred W. Lawson, of New York City, has purchased one of these boats for private use between his residence on the Hudson River and his office in the City.

The body of the boat acts as a combined float and *fuselage*, in which are the pilot's and passenger's seats arranged side by side in a very roomy cockpit. They are well protected against the rush of air, as well as against flying spray when the boat is taxying on the water, by a shield rising from the nose of the boat and extending back to the pilot's seat. The boat consists of a very strong framework of wood, covered in front with a metal skin, and in the rear portion with a specially prepared fabric, the whole being painted with waterproof paint. The rear portion of the boat, which carries the tail planes, may be detached as a separate unit in machines which have to be packed for shipment.

Mounted on strong bearers attached to the struts of the inner *cellule*, is the engine ; a 90 h.p. Austro-Daimler directly drives the propeller, which is placed behind the main planes, the rear portion of which are cut away in order to provide clearance for the propeller. As will be seen from the accompanying photographs, the upper plane has a slightly larger span than the lower plane.



THREE VIEWS OF THE THOMAS FLYING BOAT.—Left: The machine at rest on the water. Right: Starting. Inset: The boat in flight.

Lateral balance is maintained by two large *ailerons* of the compensated type, while directional control is effected by means of rudder and elevator of the usual type, carried on the rear extremity of the boat. Two small floats on the tips of the lower plane protect that member against contact with the water. Below we give a table of the leading dimensions of the machine :—

Upper plane ...	43½ ft. span	Length of body ...	24 ft.
Lower ,, ...	33½ ,,	Weight, empty ...	1,180 lbs.
Chord	5½ ,,	Useful load ...	400 ,,
Gap	5½ ,,		

Speed with 2 people and 3 hours' fuel : 60·1 m.p.h.
Alighting speed : 40–45 m.p.h.

THE ROYAL FLYING CORPS.

The following appointments were notified in the *London Gazette* of the 3rd inst. :—

R.F.C.—Military Wing.—Capt. Archibald C. H. MacLean, the Royal Scots (Lothian Regiment), is advanced from Flying Officer to Flight Commander, on appointment to the Central Flying School as an instructor, *vice* Major J. D. B. Fulton, C.B., Royal Artillery, dated December 18th, 1913.

Special Reserve of Officers.—Second Lieut. (on probation) Robert W. R. Gill resigns his commission. Dated January 27th, 1914.

Second Lieut. Victor Annesley Barrington-Kennett, from unattached list, Territorial Force, to be Second Lieutenant. Dated February 4th, 1914.

The Calshot Naval Air Station.

FOLLOWING the procedure adopted in connection with the Isle of Grain station, the Admiralty has given orders that the coastguard station at Calshot is to be appropriated for the Naval Wing of the Royal Flying Corps as part of the Calshot Naval Air Station, and from the 10th inst. the coastguard buildings will be occupied by the Air Station Staff.

More Shorts for the Naval Wing, R.F.C.

THE equipment of the Naval Wing of the Royal Flying Corps has received an addition in the shape of three new seaplanes, designed and built by Messrs. Short Brothers. A fourth machine of similar type commenced its official trials last Saturday.

SOME NOTES ON THE PRINCIPLES OF STEERING AND STABILITY IN AEROPLANES.

By MAURICE J. DODD, Assoc.M.Inst.C.E.I.

THE warp *cum* rudder system of steering has come in for such severe criticism in recent Press articles and pronouncements that I am encouraged, once more, to make an effort to put even a small nail in its coffin.

I think it was on reading in the first or second issue of FLIGHT a comparison of the Wright and Voisin machines that I first became impressed with the necessity of improving on that system, if serious progress were to be made in flying. It was stated, on the authority of Wilbur Wright himself, that the machine was held in the air by the aeronaut, and that it possessed no inherent or natural stability. I became very interested in the subject, and began to study the flight of birds. I shot some rooks, seagulls, jackdaws, &c., and made careful measurements of the wings. At first, the bird's wing was certainly an enigma, but I made a careful study of every detail, and slowly, one by one, the reason and object of each peculiarity that I noticed revealed itself, each one filling me more and more with admiration for the marvellous excellence and efficiency and beauty of the whole design. In the early part of 1910 I had a fairly well-established sense of the natural system of controls, and in June of that year I patented controls based on the principles of the bird controls. At the same time I patented a type of "bird wing," which I believed, and still believe, to have quite remarkable natural stability. I made some endeavours to introduce the subject to manufacturers—my receptions were sometimes courteous, sometimes not, but always frigid. Manufacturers are naturally shy of new theories, no matter how impressive, that have not been proved in actual flight. That proof I was not in a position to give them. Circumstances militated against any further attempts to develop the matter; but in the light of recent evidences of the trend of opinion, I venture to submit the following notes.

For convenience of reference, I propose to number my paragraphs consecutively. I feel that apology is needed for what may appear to be a too pronounced dogmatism, but I hope it will be sufficient to say that these notes represent conclusions at which I arrived rather than arguments or assertions of absolute fact. I am a poor controversialist, but I shall deem criticism a favour.

1. Steering by vertical and horizontal rudders, *i.e.*, organs set at a distance from the main supporting surfaces and working through considerable leverage, is bad in principle.

2. The effect of such organs is to force the machine on to a path other than the natural path, which is determined by the *static* conditions underlying its design.

3. A machine flying in an established path has considerable inertia. The forcible alteration of the path by the use of a horizontal rudder of big leverage, suddenly pulled into the full air blast, momentarily increases the pressure on the planes to an extent that is extremely difficult to measure.

4. In a machine designed to fly at an angle of, say, 5°, a very slight movement of the elevator is sufficient to increase the angle by, say, 2½°. The pressures increase by 50 per cent., and coming with such rapidity the effect, as of a live load, may be taken to be doubled; so that at the moment the pressures on the planes have been increased by something like 100 per cent.

5. Shocks of this character are bad for lightly-built structures, such as aeroplanes, and militate against efficient design.

6. The amount of success already achieved by the use of warp and rudder controls demands more delicate handling and more concentration on the part of the pilot than is safe or wise to expect.

7. Rough or too sudden use of the elevator results either in stalling or diving—either is dangerous.

8. It is part of the system that the pressure reaction on the elevator or rudder is used to force a change of the attitude of the machine: *i.e.*, the method is *kinetic*; the efficiency of these organs, therefore, depends on the speed.

9. Both vertical and horizontal rudders lose all their power on such critical occasions as when a "stall" occurs. The aviator is left perfectly helpless, and unless he is high enough, and has nerve and skill enough to follow Pégoud's plan, a bad smash must result. The same applies in a lesser degree to the cases of starting and finishing a flight. Where quick responsive control is of the most importance horizontal and vertical rudders are less effective.

10. These facts are gradually coming to be recognised by aviators and those who have made a scientific study of flight:—"If a study be made of the enormous number of fatalities during 1913, one is struck by the extraordinary number of unexplained nose dives and cases of pilots being thrown from their machines while in flight." (Gordon-England, FLIGHT, November 1st, 1913).

11. The horizontal rudder produces two rotations, stalling and diving. "Of the two a stalling rotation is more dangerous for two reasons, (*a*) because the pressure angle is increased, which increases the resistance, and, unless the thrust of the screw is increased proportionally, the speed is decreased. This is always dangerous, and many accidents have been due to stalling; (*b*) if the angular velocity of a stalling rotation is high there will be a rapid increase of pressure per square foot on the supporting surfaces, and this sudden strain may cause the machine to collapse. Several deaths have been due to this cause. . . . If the angular velocity of the diving rotation is too high a *downward* pressure is produced upon the supporting surfaces which may cause their collapse downwards."—(Merrill, FLIGHT, November 15th, 1913.)

12. These results are independent of those produced by variation of the positions of pressure centres following variations of the angles of incidence. They are, as a matter of fact, magnified when considered in this connection—but these latter results are properly considered under the head of stability.

13. "Thus it is that when an aeronaut acts to initiate a *vol plané*, or to set his machine for a very rapid descent, especially where high velocity is intended, that the greatest danger from catastrophic instability is to be feared. It seems that there should be some check or limit prescribed to the turning downward of the tail members."—(Lanchester, FLIGHT, November 8th, 1913.)

14. "When at a height of about 300 feet he was observed to be descending at a very steep angle. Shortly after this he fell out and was killed. . . . There was practically no wind at the time of the accident. . . . When examined after the accident all the controls were found to be in order. . . . The Committee is of opinion that the accident was due primarily to the pilot forcing the aircraft down at too steep an angle, resulting in his falling forward on his control and accentuating the steepness of the descent."—(Accidents Investigation Committee's report on the accident to Major Merrick, FLIGHT, November 1st, 1913.)

15. "As in all other phenomena connected with flight, the time element is a factor which determines the nature of the result which follows the use of the rudder. In a machine in which the moment of inertia about the longitudinal axis is greater than the moment of inertia about the vertical axis, too quick a rotation about the vertical axis will spin the machine without giving it time to bank, and skidding will result."—(Merrill, FLIGHT, November 15th, 1913.)

16. This is the case with the great majority, if not all, the machines in use at the present time. The weights disposed round the longitudinal axis (wings, stays, &c.) are placed wide, while the weights disposed round the vertical axis (engine, pilot, chassis, &c.) are placed at or quite close to that axis.

17. "There are other means for producing banking rotations. The one most commonly used was first reduced to practice by the Wright Brothers, and it consists of warping the supporting surface in a manner such that the pressure angles at the tips are unequal, the larger angle being at the tip which must be raised. . . . While machines using this system fly, and fly well, in the hands of good pilots, there is a fundamental error in this system which increases the danger of flying. Since the pressure varies as the square of the speed, it is evident that to change the angle of a tip, which must be raised, in such a way as to reduce its speed, will produce a result the opposite of what is desired unless some offset is introduced. . . . . It is at this point that the rudder comes into play as an offset. The rudder is turned so as to prevent any rotation about the vertical axis, and hence keeps the tip speeds equal, then the difference in the pressure angles produces a banking rotation. . . . With lateral stability, as with longitudinal stability, flying machines are designed so badly that a dangerous couple that should not exist has to be offset with another couple controlled by the pilot. The horizontal rudder has to be used to prevent stalling, and the vertical rudder has to be used to prevent the disastrous effect of the warp alone."—(Merrill, FLIGHT, November 15th, 1913.)

18. "It would seem that in aeroplane construction designers have refused to employ anything but controls acting *differentially*; that is every time one particular organ of control had to fulfil a definite function, it has been so designed, with the greatest ingenuity, as to fulfil precisely the opposite function as well. Sometimes even—and especially with the warp on large span machines—this opposite effect preponderates and must be overcome by bringing another organ into play. But in any case, the differential action of the controlling organ compels the designer to make its dimensions unnecessarily large. . . . The warp therefore acts differentially, so that in large span machines, where the drag is considerable, its detrimental effect has to be counterbalanced by an opposite effect obtained through the use of the rudder. The necessity for operating the warp in conjunction with the rudder, therefore, only results from a defect in the method of warping, which as known at present

is a barbarous method."—(Duchene, quoted by Merill, FLIGHT, November 15th, 1913.)

19. To obtain a clear conception of the problem, it is necessary to investigate briefly the physical laws governing motion in a circle.

20. A body in motion tends to preserve its motion in a straight line. It will not and cannot move in a circle unless there is a deflecting force urging it towards the concave side of a circle.

21. There are only three elements in the problem. These are (1) the deflecting force; (2) the velocity at which the body moves; (3) the radius of the circle in which it moves.

22. These elements are co-related, and the conditions necessary to preserve circular motion are represented by the formula $f = \frac{v^2}{r}$, where f is the deflecting force, v the velocity, and r the radius of the circle.

23. We, therefore, see that the deflecting force must be directly proportional to the square of the speed and inversely proportional to the radius.

24. With constant velocity, therefore, the radius of the path taken depends on the deflecting force only, and is inversely proportional to that force. Translated into flying terms, this means that the sharper the turn the greater the amount of banking required, and *vice versa*.

25. A very good illustration of the conditions obtaining when an aeroplane is turning is the simple but classical experiment of the stone at the end of a string swung in a vertical circle. The tension on the string when the stone is in the lowest position consists of two parts—(1) the weight of the stone, which may be represented by mg if m represents the mass of the stone, (2) the deflecting force necessary to prevent the stone from flying off along the horizontal tangent at that point, and which may be represented by the symbol $m\frac{v^2}{r}$. When the stone is at the highest point, gravity reduces the tension on the string, which is now the difference between the two forces, viz., $m\left(\frac{v^2}{r} - g\right)$. Circular motion is, therefore, only possible when the velocity is such as to make $\frac{v^2}{r}$ greater than g, otherwise the stone will fall in towards the centre of the circle.

26. Applying these results to the case of an aeroplane it will be seen that danger becomes imminent when the deflecting force becomes greater than the speed and the radius of the curve demand.

27. A first principle is, therefore, that the deflecting force must be kept under careful control, and all movements or elements tending to produce reactions directed towards the centre of the circle must be carefully watched.

28. A second principle is that as the magnitude of the deflecting force, which may be applied with safety, is proportional to the square of the speed, the greater the speed the greater the margin of safety. Any system of steering which involves considerable loss of speed when turning is bad in principle.

29. Let us now investigate the warp and rudder principle as applied to turning in the horizontal plane. In turning the use of the vertical rudder initiates a spin round the vertical axis of the machine.

30. Banking is thus caused owing to the different speeds of the wings.

31. This banking, being *kinetic* in origin, is cumulative in its effect so long as the rudder is held over, and must be continually checked by the pilot. When the rudder is brought to the normal position the bank disappears and the turning movement is stopped.

32. This explains the oscillating motion so noticeable in turning by this system.

33. The warp is an inefficient method of checking a bank, as it can only be effective when the speeds of the wings remain the same or thereabouts.

34. This result can only be achieved by bringing the rudder into action against the turning movement itself.

35. It is clear, I think, that the bank is caused and maintained by *kinetic* conditions, *i.e.*, by power absorbed from the engine, so that speed must fall off and the controls at once lose some of their effectiveness. The very use, therefore, of these controls begets inefficiency. Resistance is increased on both sides, speed drops, and altitude is lost.

36. Loss of speed when turning is always dangerous, and loss of altitude is dangerous when flying low.

37. In looking for those elements which produce reaction directed towards the centre of the circle, the first element that occurs to us is the "bank." Curiously enough the value of the "bank" as a deflecting force is exactly proportional to the square of the speed and inversely as the radius. The "bank" by itself, therefore, is not dangerous; on the contrary, it gives exactly the deflecting force required to produce the turn in safety, and, other considerations apart, the machine will turn in a circle, the radius of which bears a strict proportionality to the amount of "banking." It should be noted, too, that in machines where the centre of gravity coincides with the centre of pressure of the planes projected along the longitudinal axis, the deflecting force of the "bank" is applied directly to the centre of gravity, that is without the intervention of a lever arm. There is, therefore, no tendency to produce rotation or "spin" round the vertical axis.

38. The second element is naturally the rudder. It has been noted that the effect of the rudder is to produce rotation or "spin" round a vertical axis, which passes through the centre of gravity; a movement which at once adds a very considerable part of the propeller thrust to the sum of the deflecting forces. This is a most important consideration, to my mind. Any reaction working through a powerful lever arm tending to produce inward spin is very dangerous: the powerful thrust component may suddenly and easily prove too great for the forces tending to preserve circular motion, and in this case an inward fall becomes inevitable. It would be the case of the stone on the string again. It must never be forgotten that so long as we mount our propellers at a distance from the centre of gravity of the machine, the thrust must take up a lateral component when turning, for the simple reason that a straight line cannot coincide with a curve. For safety it is essential that the thrust line shall remain tangential to the curved path followed by the c.g. of the machine. It is not possible to ensure this when the turn originates in vertical axis spin. The moment the thrust line cuts through the curve, danger is imminent: the machine may be out of control before the pilot has realised his position. This danger could be obviated by mounting the propeller at the centre of gravity—a plan which presents considerable constructional difficulties.

39. The warp on the inside wing also as tending to produce inward spin is inherently dangerous—if used at all, it should be used to retard the *outside* wing when the rudder is also used. The warp counteracts the spin produced by the rudder, and leaves the bank free to do the turning.

40. This system of turning by ruddering in and warping the outside wing, originated, I think, by the late M. Lefebre, is a safe turn, if there is plenty of room to drop. As, however, there is a very considerable loss of speed, the system is inefficient.

41. Speaking generally, the combination of warp and rudder tending to produce spin and increased head resistance, which means loss of speed, is bad in principle.

Stability is a *static* problem: *kinetic* controls as now used simply outrage the *static* principles on which stability depends.

42. The very extraordinary feats of Hamel and Chevillard will, I believe, if analysed, show that their success is due to the fact that the machine is banked to such an extent that the rudder effect is eliminated and the turn is done by the banking alone.

43. We cannot expect all our aviators to be Hamels and Chevillards—progress would be slow if we were to wait for that, and in any case it might not always be convenient to make the short-radius "stunts" that they do.

44. Permanent negative pressure tips reduce efficiency and speed, and are not in practice necessarily conducive to stability, as gusts are often known to touch one part of the wing only. They may strike either the positive part or the negative part; to bring stabilising reactions into play, the gust should strike the wing evenly. A gust coming in from the side would first depress the tip and might prove dangerous. The "bird's wing" type, different forms of which have been patented by Mr. José Weiss, Mr. Handley Page and myself, is, I believe, as stable as anything can well be made. The late Lieut. Parke, in writing of the Handley Page wing, said:—"Now as regards her inherent stability: her lateral stability is as near perfect as I can imagine; she just simply floats about quietly, quite regardless of *remous*, propeller draughts, &c.: you can feel them hit her and her consequent 'automaticing,' but it does not worry her at all."

The stability of this particular wing is derived, I believe, from the bluff entering edge, the varying chord and camber, and the "hump" on the wing; not from the negative tips.

45. Negative warping of the inner wing, causing as it does an inward spin, is most dangerous. A "centrifugal couple" tending to reduce the banking cannot be relied on, as this would be quite negligible when compared to (*a*) the powerful lateral component of the propeller thrust, (*b*) the increased lift of the outside wing owing to the relative increase in speed, which would be very great indeed if the extreme tip of the opposite wing were to be warped negatively.

46. In gliding, birds change their direction by banking alone. The banking is produced by retiring the inside wing; the retirement is accompanied by a movement giving the wing a slight downward dihedral set.

47. The tail is not used as a rudder. In flapping flight the tail is usually folded. In gliding flight it is always expanded, and is in almost constant oscillatory motion. It is used, in fact, as an adjustable vertical fin. If a bird is looked at in side elevation, it will be noticed that the "keelplane," by which I mean the projection of the wings and body on the plane of symmetry, is, so to speak,

concentrated and balanced round the bird's centre of gravity. The "hump" on the wing balances the downward curve of the body. This means that when the tail is folded a bird has no "weather-cock directional stability"; a gust of wind striking the bird sideways would therefore tend to bring the bird with it. When flapping, the bird instinctively corrects this by the power of the wing alone. In gliding, however, the expanded tail oscillates so as to convert itself into a vertical fin, which tends to hold the bird into the wind and preserve direction.

48. I shall now describe briefly the controls which I advocate.

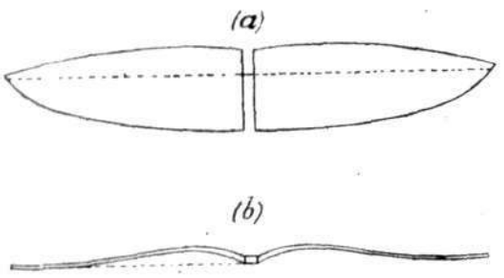


Fig. 1.

Fig. 1*a* shows in plan form wings of the character suggested, while Fig. 1*b* shows a section through the single spars or arms on which the wings are mounted. The wings are mounted on central spars which can rotate round a horizontal axis, so that the angles of incidence of the wings may be decreased or increased at will. In my early models the wings were mounted independently, but as the result of more recent experiments I now connect them so that alteration of the angles of incidence is simultaneous for both wings. In plan form the entire trailing edge is roughly a semi-ellipse struck on a major axis equal to the span selected and a semi-minor axis carefully proportioned to the span. The leading edges of the wings are parabolic curves struck on bases equal to two-thirds of the span commencing from the tip of each wing. The two vertices are, therefore, one-third of the total span from each tip. The heights of the parabolæ are also carefully proportioned to the span. The spars are centred along the dotted line shown in the figure, or at one-third of the chord measured from the leading edge at the vertices of the parabolæ. The lower line of the section of the spar (Fig. 1*b*) is for the lower or under surface of the wing the line which connects the points situated highest in all the transverse sections of the wing. In other words, it is the line of the highest points in the camber.

It will be seen, therefore, to commence with, that on the under side there is no camber at all at the root of the wing, that the camber rapidly increases until a point is reached just short of one-third of the length of the wing—in fact, it is little more than two-ninths; that from that point the camber is slowly decreased until it disappears altogether at a point at or about two-thirds of the length of the wing, and that the remaining third is perfectly flat, or so slightly curved that the pressure movements are practically identical with those on a flat plane.

By examining and comparing the plan and section, it will be found that sections of maximum camber and chord coincide at the point already indicated, and that the centre of area of the whole wing is not far removed from this region. All points on the perimeter of the wing are on the same plane except just on the body side of the vertices of the parabolæ, where the leading edge is slightly arched upwards so as to give a greater angle of incidence here than at any other part of the wing. In fact, everything that contributes to lifting effect is at a maximum just at this point.

The entering edge is bluff near the body, tapering towards the tip. The line of highest points on the top camber is close to the leading edge at the body-end of the wing, but gradually recedes to the middle of the wing (fore and aft) near the tip. The details of top and bottom camber, &c., as described, are designed with the object of fixing, absolutely, the position of the centre of pressure so that disturbing effects cannot arise with variations of incidence within the limits of ordinary flying angles.

The tail is a large area non-lifting tail of short leverage, capable of being oscillated after the manner of a bird's tail. I also provide means for up and down movement, as with ordinary elevators, but I believe that this will no longer be necessary when the machine has passed the experimental stage.

The manner of operating the wings for the purposes stated above—viz., to maintain stability, to steer and to vary the speed of flight—will now be described.

The spars on which the wings are mounted are connected to the body by an articulated joint so that they may be moved forwards and rearwards by rotation in the plane of their incidence to the wind; in other words, when moved forwards they get a slightly upward dihedral set, and when moved backwards they get an inverted dihedral set. This fore and aft motion is independent of the motion by which the angles of incidence are varied. Fig. 2 (*a*) shows the plan form in ordinary flight; (*b*) shows the position in which the wings are placed for ascent, and (*c*) for descent, while (*d*) illustrates in plan form the position which would be taken to make a right-hand turn.

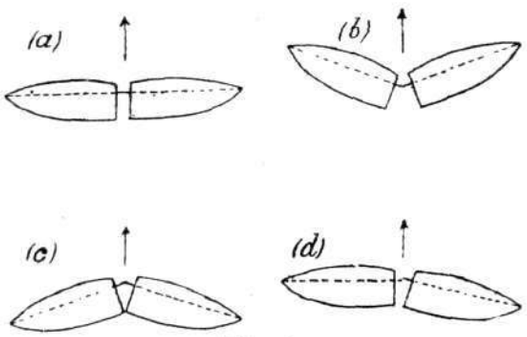


Fig. 2.

In the same way, for a left-hand turn, the left wing should be retired. In (*b*) both wings have been advanced, and, as already explained, they have, therefore, a slight upward set. The centre of upward pressure has been brought to a position in front of the centre of gravity; as well as this, the centre of resistance has been raised without being increased. These combined results cause the machine to ascend. In (*c*) the reverse has taken place—the wings have been retired, at the same time getting a downward set so that the machine is caused to descend. In (*d*) the right wing has been retired without alteration of the angle of incidence. This operation results firstly in causing the machine to bank owing to the shortening of the lever arm through which the upward pressure acts, and secondly in lowering the keel-plane in relation to the longitudinal axis of rotation and in moving it backwards in relation to the vertical axis of rotation. These results are most advantageous when turning. The machine, deflected by the "banking" which changes the direction of the aero-dynamic reaction on the planes, turns to the right. The rapidity of turning can be increased or decreased to any degree required by a corresponding retirement of the inside wing. Stability, both lateral and longitudinal, is controlled in the same way. If the machine be dipping, both wings are advanced; if rising, both wings are retired. If the machine be canted to one side the wing on the rising side is retired, and so on.

49. In comparing this system with the warp and rudder system I should like to point out that:

(*a*) In all the movements described, the *static* conditions which govern stability are maintained unimpaired.

(*b*) In turning on the wing control principle the inside wing is retired, which has the effect of shortening the pressure arm on that side, so that the centre of pressure moves towards the outer side of the curve; the machine, therefore, tilts over until the c.g. is directly under the new position of the c.p. The "bank" is now, therefore, both caused and maintained by *static* conditions, and the method would be equally effective if all speed were lost, and the machine were dropping vertically through the air. The effect is not cumulative in tendency, and absorbs no power from the engine. The turn is not made round a permanent centre fixed at the c.g of the machine, but round a virtual or instantaneous centre on the line of the pressure produced, so that practically speaking the two wings move at equal speeds. It should also be noted that as the curve is generated by the translatory motion of the centre of gravity, and by that alone, *the line of the propeller thrust must always remain tangential to the curve.*

(*c*) In changing direction upwards or downwards, the static conditions are also preserved. Direction is changed not by *kinetic* violence, but by a slight movement of the wings, which changes the relations of pressure and gravity—the weight of the machine acting through a tiny arm of a few inches is the agent that now changes the direction. It is clear, I think, that there can be very little violence or shock here. The machine gently swings into her new path. The system consists in readjusting the conditions of stability so that she automatically takes up a new position, in which she is just as stable as she was in the old one. Contrast the graceful movements of the birds with the jerky oscillatory turns usually made by aeroplanes even in the hands of the most expert aviators.

50. Remembering the balance of the keelplane round the centre of gravity, the upward and downward set of the wings which accompany advance and retirement respectively become of importance. In turning in what is called "still air," danger may come

from a gust suddenly arising and coming in from the outside of the curve. This would have the effect of suddenly increasing the deflecting force to a degree perhaps beyond what the velocity and radius demand. The downward movement of the wing has the effect of bringing the centre of the keelplane below and to the rear of the centre of gravity, through which the various axes of rotation of the whole system pass. A gust coming in from the convex side would now, therefore, have the effect of reducing the bank, and holding the machine into the gust, both movements tending to safety. In turning into the wind a sudden gust would have the effect of increasing the bank, and holding the machine into the wind. The increased amount of banking would automatically increase the deflecting force, thus preserving the necessary conditions for circular motion. A sudden cessation of the wind would have the effect of decreasing the bank and giving an outspin for safety. In turning down wind, the conditions are identical with those arising when an inward sweeping gust suddenly arises in "still air," and which I have already referred to.

51. I have already observed that not one of these movements increases head resistance to flight; on the contrary, I believe that in practice the velocity will be found to increase when turning. It will be obvious that the banking reduces the lift of the wings, and a loss of altitude would in the ordinary way result—the loss of lift is, however, converted into a centripetal force which when compounded with the propeller thrust may give increase of speed sufficient to counteract the loss of lift. Nothing but actual test, however, can show whether such a result is obtainable. I have often noticed birds turning, not only without loss of altitude, but with apparent gain.

52. When gliding, birds always retire the wings for descent at angles steeper than the ordinary gliding angle and advance them for ascent. Birds fly without any apparent difficulty in a *cabré* attitude, the reason being that the raised wings raise the centre of the keelplane, and so counteract the effect of the low tail. In any case, the absence of a rudder or anything in the nature of a vertical fin near the tail reduces the danger of the *cabré* attitude. Such a result in an aeroplane would mean that the machine might safely climb *cabré*, and so avail of the full power of the propeller thrust.

53. Further than this, the fact that incidence could be altered in flight would obviate the necessity for the machine to take the *cabré* attitude, in order to obtain support, in the case of a failing engine.

54. When flying obliquely across a regular wind, the windward wing may be retired; this holds the machine into the wind and corrects for drift without increasing head resistance. Correction by rudder increases head resistance. I have frequently seen rooks gliding in this way at tremendous speeds right across a gale of wind.

When extra weight is taken, such as a passenger or more, the balance of pressure and gravity can at once be adjusted by advance or retirement of the wings, thus enabling the machine to fly always under the most favourable conditions. Greater liberty for disposing of loads is also allowed—once in the air the pilot can immediately bring the machine to a level keel. This is the plan the birds adopt when carrying food, &c.

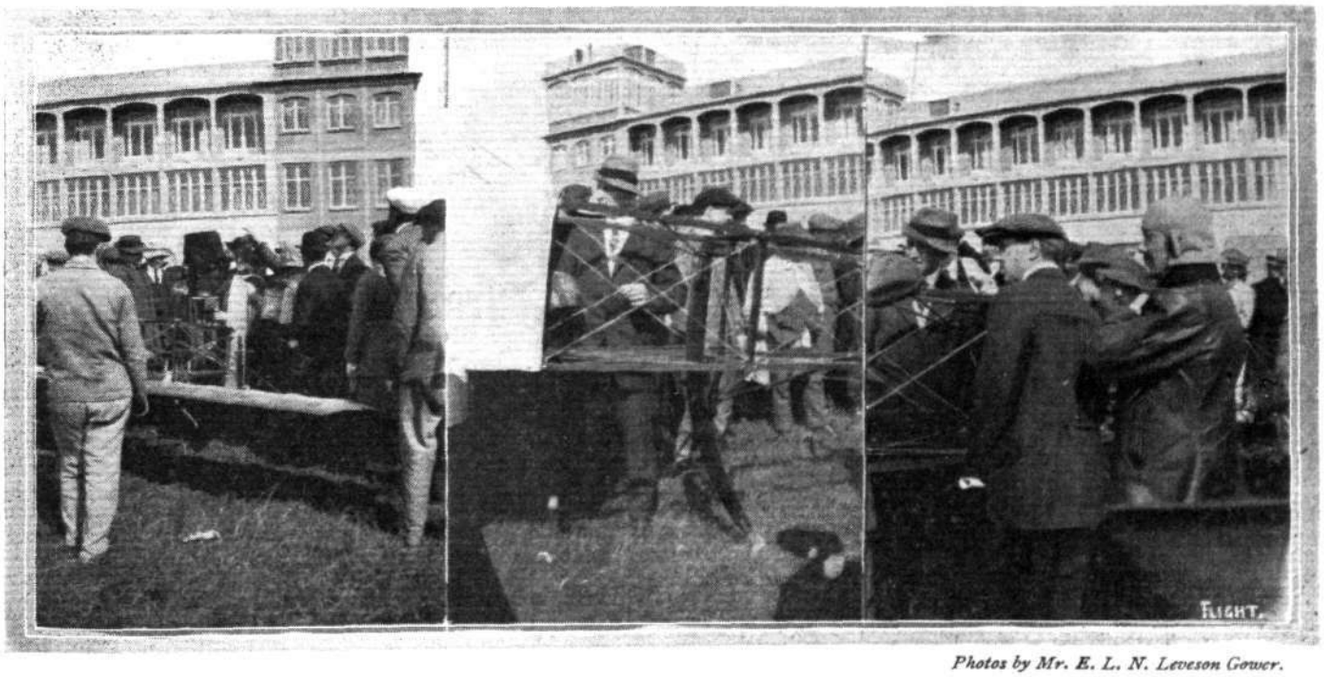
55. The investigation of the problem of turning in the air has been confused by a false analogy, drawn from the case of steering a boat. Because the rudder and bows reaction produces spin, it is thought proper to follow the same plan. There is a true analogy in this—that the naval architect makes use of *kinetic* force to deflect his ship; this must be the case either in the air or on the water from the very nature of the laws of circular motion; but for stability he depends on *static* conditions. The plan must also be followed in the air.

56. In considering and comparing systems used by birds with systems which may be safely adopted on artificial flying machines, it must not be forgotten that birds get propulsion from their wings, *i.e.*, the thrust is applied directly to the centre of gravity, whereas in artificial flying machines the thrust is applied directly to the face of the propeller blades, which is usually situated at some distance from the centre of gravity, and hence capable of taking up a lateral component.

57. It follows, therefore, there are certain movements used by birds which cannot be imitated on aeroplanes. I believe birds do sometimes depress the inside wing tip, as described by Dr. Hankin, and possibly give the tip a negative angle of incidence, but, I believe, that this is a nicety of control into which we cannot follow them. Birds have not got a shrieking propeller thrust to deal with—we have.

58. When all controls are exercised by the the wings, and by the wings only, the machine must follow a natural path determined by the attitude of the wings. With independent rudder and elevator, the machine may be and almost invariably is in practice forced into a path other than that which the wings lay down for her to follow—a proceeding naturally attended with great risk. The *vol piqué*, for instance, would be an impossibility with wing control. Quick descents could, of course, be made, but they would be a consequence of the alteration of the natural gliding angle of the machine.

It has been suggested to me that there are certain constructional difficulties in the way of building a full-sized machine on the lines I have described. Speaking as a practical engineer, I can say that I have designed a full-sized machine with a factor of safety of eight in all the component parts; that the weight is not above the average, and that a considerably higher factor of safety could be allowed without making the weight excessive.



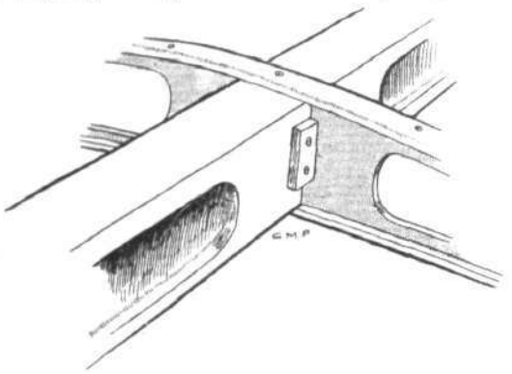
Photos by Mr. E. L. N. Leveson Gower.

The above snaps are of considerable historical interest from the fact that they show the scene at Buc upon the occasion when Pegoud for the first time "looped the loop" on his Blériot. On the left Pegoud is seen pointing out to those concerned the exact spot where he intended to make his first loop. In the centre picture is the late M. Perreyon, and in the right-hand picture from right to left MM. Pegoud, Domenjoz and Perreyon.

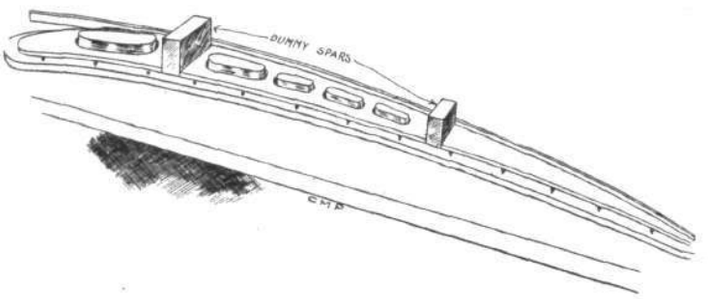
AN AEROPLANE IN THE MAKING.

IN these days of aerial locomotion when the sight of an aeroplane flying overhead is such an everyday occurrence as to excite comparatively little interest, one is, perhaps, a little apt to overlook the enormous amount of work and the forethought and care devoted to the production of a modern aeroplane. For this reason we think that the majority of our readers will be interested in a description of the different stages of evolution which a machine passes through from the time the designs leave the draughtsman's table until it is ready for the air.

We are indebted to the Sopwith Aviation Co., Ltd., for their courtesy in giving us every information and in placing their extensive works at our disposal for the purpose of obtaining the necessary notes and sketches. It would have been difficult to find a more representative firm, for at their works at Kinsgton, where the Sopwith Aviation Co. employ some 150 workmen, in addition to a large staff of draughtsmen, all the most up-to-date machinery and latest labour-saving methods are employed, whilst the workmanship of their machines has already established for them an enviable reputation, equalled only by the excellence of their design.



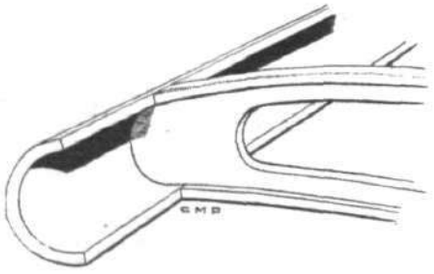
Attachment of ribs to spars.



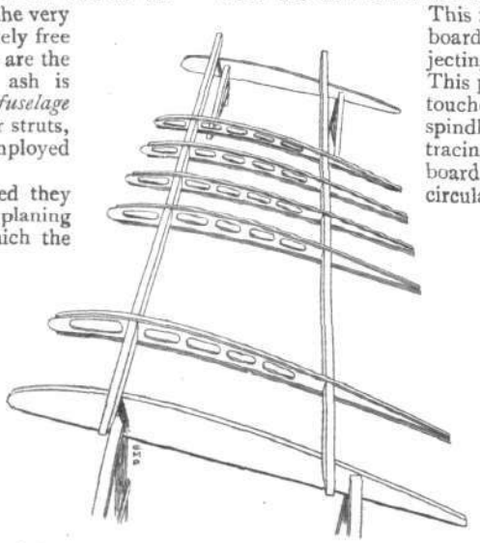
Sketch showing method of assembling ribs.

As wood is the material mostly employed in the construction of the majority of aeroplanes a start will be made with the wood working department. It is almost needless to point out that all the wood used for aeroplane construction must be of the very best quality, air dried, well seasoned, and absolutely free from knots and shakes. Spruce, ash and poplar are the woods most generally employed, and of these ash is generally used for the longitudinal members of the *fuselage* and for the wing spars, whilst spruce is used for struts, ribs, cross-members, &c. Poplar is frequently employed for the webs of the ribs.

When the planks have been thoroughly seasoned they are sent to the shop in which are the saws, planing machines, spindle machines, &c., by means of which the rough wood is converted into ribs, struts, skids, spars, or in short, all the finished parts that go to make up an aeroplane. They then go to the different machines to be shaped into form according to the purpose for which they are intended.



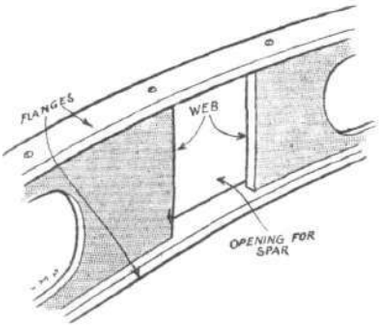
The hollow leading edge and its attachment to rib.



The ribs are slid along spar, beginning with centre one.

The wing spars are first sawn out of a plank of approximately the desired thickness. If they are not of exactly rectangular shape they pass through the spindle machine, which, briefly speaking, consists of a table or platform through which projects a vertical shaft revolving at a very high speed (about 5,000 revolutions per min.). This shaft carries the knives or cutters by means of which the parts are given the desired form, and which are interchangeable, so that by substituting a different set of cutters the same spindle machine may be used for a variety of purposes. In these spindle machines the spars are given their final form with the spaces between the ribs cut down to an I section for the sake of lightness. The spars are now sent to another department to have the ribs fitted. These latter have in the meantime passed through various stages as follows: The planks from which the ribs are to be made are first sawn out to a thickness slightly greater than the desired thickness of the webs. These thin boards are then planed down to exact size on the planing machine. Before proceeding to describe the manufacture of the ribs, it is as well to call attention to the fact that the webs of the ribs are divided into three pieces. The front portion runs from the leading edge to the front spar, the second part runs from the rear side of the front spar to the front side of the rear spar, whilst the last piece continues from the rear spar to the trailing edge. These three parts of the web of the rib are held together by two thin flanges screwed into the edges of the web.

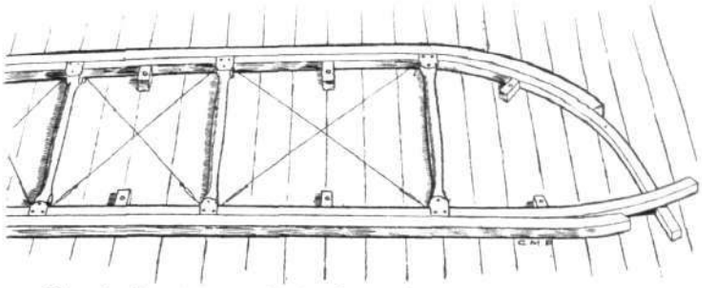
The method of manufacturing the different parts of the webs is as follows: A template of exactly the same size as the particular section of the web is placed on top of the thin boards from which the webs are cut and their outline is traced by means of some sharp instrument such as an awl. The man who performs the tracing or marking off then passes the boards on to the man in charge of the jig saw, who cuts out the individual webs, taking care to leave about $\frac{1}{16}$ of an inch all round the tracing line. The webs are now cut down to their exact size on a spindle machine. This is done by nailing the rough web to a board of the same shape as the web but projecting about $\frac{1}{4}$ of an inch outside the web. This projection is of such a width that when it touches the circular guide on the table of the spindle machine, the cutters will just touch the tracing line, so that by pushing the carriage board to which the web is attached along the circular guide, which is concentric with the spindle, the webs are cut to the correct size and shape and, as the carriage board used is the same for all the webs, it follows that they will all be cut to the same size.



Sketch showing opening in rib through which the spar passes.

From the wood working department the webs are sent to the erecting shop where the flanges are screwed on and the ribs finished off ready to go on the spars. The method of assembling the ribs is as follows: The three parts of the webs are placed on a former of the same shape as the finished rib, and having two short pieces of wood attached to it to represent the spars. The web pieces are butted against these dummy spars, and the flanges are put into place and held temporarily in position by tacks nailed along the former at certain intervals. The flanges are then secured to the webs by means of small screws, and the ribs are passed along to another man

who chamfers off the edges of the webs with a spokeshave, after which the ribs are ready to be put on the spars. Their position having been marked off on the spars, which are placed on two trestles, the ribs are put into place by sliding them along the spars, beginning with the centre ones. This operation is carried out by two men whose business it also is to see that the different steel clips and sockets are put into place between the proper ribs. The leading edge is then secured to the ribs by means of screws, and the trailing edge, which in the Sopwith machines consists of a flattened steel tube, is attached by means of thin aluminium clips. The diagonal



Sketch showing method of building up *fuselage* on the floor.

cross bracing of the wings is then tuned up, care being taken to keep the ribs at right angles to the spars (in the plan view) and after being varnished the wings are ready to be covered.

The fabric used for this purpose is sold in comparatively narrow widths. It is cut off in lengths sufficient to go from the trailing edge round the leading edge and back to the trailing edge again These narrow strips of fabric are first stitched together until a sufficient width is obtained to reach from the root to the tip of the wing. The fabric is applied by securing one end of it to the trailing edge, passing it round the leading edge and back again to the trailing edge where the other end of it is attached. As most of the dopes used for the purposes of rendering the fabric air- and water-proof possess a certain amount of contractility the fabric is not applied very tightly to the wings, in order to allow for the tightening up by the dope. If the fabric were put on too tightly the dope would contract it to such an extent that the wings might be warped out of shape. After three or four coats of dope have been applied with several hours interval between each the wing is ready to be mounted on the *fuselage*.

The method of constructing the *fuselage* is similar to that employed in building up the wings. The *longerons*, struts and cross-members are all cut to shape on the spindle machines, and, this being done, they are taken to the erecting shop, on the floor of which are secured some thin strips of wood bent to the shape which it is desired to give the *fuselage*. The *longerons* are placed on the floor, and kept to the desired shape by wood blocks pressing them against the strips on the floor. The struts with their respective sockets are then put in place, and the two sides of the *fuselage* made rigid by means of diagonal cross-bracing. Each of the bracing wires has incorporated in it a wire strainer in order to allow of each bay being tuned up separately. When the two sides are thus finished they are raised up on edge and connected by the cross-members and by diagonal bracing, and the whole structure is then adjusted, or, as it is called "tuned up." The next job to be done is that of putting the engine bearers, tank supports, pilot's and passenger's seats, controls, &c., into place, and when this is accomplished the *fuselage* is ready to be covered with fabric. In the Sopwith machines, this is done by cutting the fabric to shape and, passing it around the *fuselage*, lacing it along one *longeron*. The fabric is then doped similarly to the wings, and the *fuselage* is ready for the wings.

(*To be concluded.*)

THE GOVERNMENT MILITARY STAND AT THE PARIS AERO SALON.—FLIGHT photographer, when innocently endeavouring to take a photograph of this stand, found himself, when he emerged from under the focussing cloth, surrounded by French military, and came near to having his camera and all his plates "scrapped" under the conditions. Merely looking at the photograph and what was on the stand, it would appear as if red-tapeism had been bereft of its senses to behave in such a remarkably childish manner. There was nothing staged on the stand full particulars of which could not be obtained with the greatest ease from the constructors of the various repair wagons, &c.

FOREIGN AIRCRAFT NEWS.

World's Record Duration Flight.

STARTING from Johannisthal on Tuesday at 8 a.m., Langer, on a biplane, made a flight which it is claimed beats the world's record of 13 hrs. 18 mins. made by Fourny on a biplane in September, 1912. After flying round the aerodrome for a couple of hours he went off and made cross-country flights, reappearing at Johannisthal in the evening, and landing at 10.15 p.m.

An Italian Height Record.

DURING a flight which lasted 27 min., and which took place at Vizzola-Ticino on the 29th ult., Emile Pensuti, on a Gnome-engined Caproni monoplane, beat the Italian height record by getting up to 3,850 metres.

A World's Record with Six Passengers.

AT Chartres on Saturday last, Garaix, on a Savary biplane, beat the world's height record for pilot and six passengers by climbing to an altitude of 1,750 metres during a flight of 27 mins.

Long Flight on a Farman.

RETURNING to his station on Monday, Sergeant Quennehen, on his Farman biplane flew the 320 kiloms. from Etampes to Epinal in 2 hrs. 50 mins., while his average altitude was 2,000 metres.

Maurice Farman's Week-end Trip.

ACCOMPANIED by Senoucque, Maurice Farman on Monday flew from Buc to just by Orleans, and after taking lunch with the well-known French sportsman M. Georges Leys at the Chateau d'Alloc, returned to Buc by way of Etampes and Rambouillet.

Gilbert Returns to Paris.

ON his Rhone-engined Morane-Saulnier machine, Gilbert, on the 27th ult., returned from Mourmelon to Villacoublay in two hours.

A Morane for Japan.

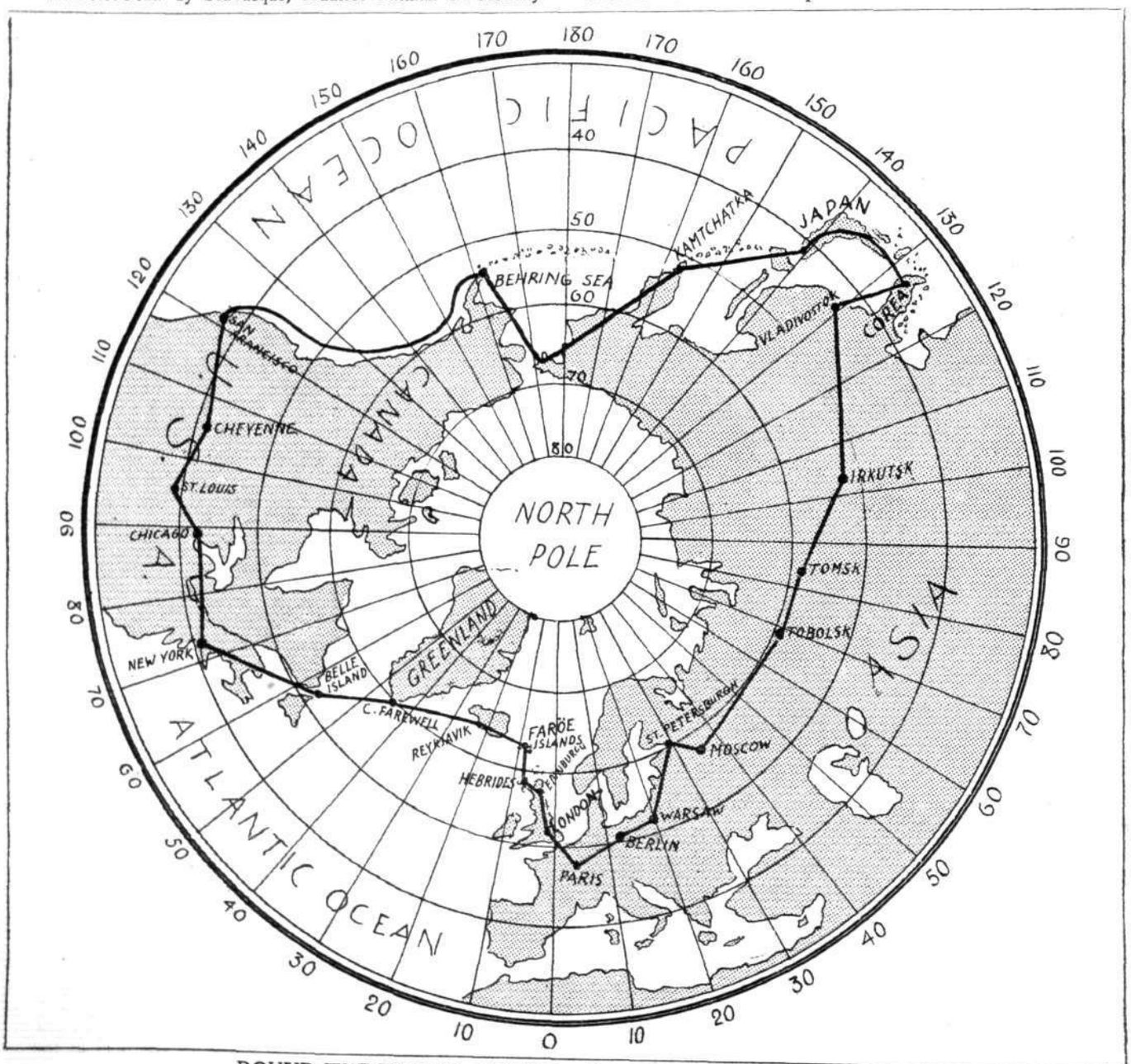
LIGER, the *chef-pilote* at the Morane-Saulnier school at Villacoublay, will leave France for Japan shortly. He will take a number of military machines with him, with the object of selling them to the Japanese Army.

A Grand Prix for Pegoud.

ONCE again the French Academie des Sports has awarded its Grand Prix of £400, founded three years ago through the generosity of M. Deutsche de la Meurthe, to an aviator, the fortunate recipient this year being Pegoud. The two previous recipients of the prize were Beaumont and Garros.

A New Farman Looper.

AT Evreux on Sunday week, Poiree, on a Henry Farman biplane, looped the loop, and also flew for a comparatively long distance with the machine upside-down.



ROUND-THE-WORLD FLIGHT.—Sketch map of the proposed route.

Pourpe Back at Cairo.

MARC POURPE arrived back at Cairo on his 80 h.p. Gnome-Morane-Saulnier on Tuesday, when he completed the 500 kilom. stage from Menshad, where he had arrived on Friday of last week from Luxor. The distance represented by the double journey from Cairo to Khartoum and back is about 4,500 kiloms.

Guillaux Leaves for Australia.

ON Friday of last week, Guillaux left Marseilles for Australia, where he intends to give demonstrations of looping the loop in the principal cities and towns. He also contemplates making a flight from Sydney to Melbourne before he returns to France in July.

Two French Officers Killed.

AN accident which occurred at the flying ground near Bourges, on Monday afternoon, cost the lives of two French officers—Lieut. Delvert and Capt. Niquet. The former was piloting the biplane at a considerable height, when it seemed to collapse, and fell to the ground.

German Machine Across the Frontier.

NOT quite so much excitement was aroused by the landing on Tuesday of a German aeroplane near Croismare, about four miles from Luneville and about six miles from the frontier, as was aroused by the landing of the Zeppelin quite close to the same place exactly ten months previously. The two officers, Lieuts. Priesten and Gomer, set out on a biplane to fly from Strassburg to Metz, but after passing Saarburg they lost their way in the fog and on landing to make inquiries found themselves in France. They immediately reported themselves to the French civil and military authorities. Later in the day they returned to Metz by train, their machine having been dismantled.

A German-Danish Waterplane Contest.

THE Danish Aeronautic Society, with the co-operation of the German Society, is proposing to organise a competition for hydro-aeroplanes, to be held during the month of August. The suggested programme is: August 15th, Warnemunde to Copenhagen, 160 kiloms.; August 16th, Copenhagen to Aarhns, 175 kiloms.; August 18th, Aarhns to Skagen, 160 kiloms.; August 29th, Skagen to Laurvig (Norway), 160 kiloms.; August 23rd, Laurvig to Christiania, 120 kilogs.

Farmans for Austria and Sweden.

AT Etampes, on the 29th ult. Bille, in testing a Henry Farman built for an Austrian pilot, with a load of 507 kilogs. climbed 300 metres in 4½ mins. Later, on a similar machine purchased by the Swedish Army, he rose 500 metres in 6 mins., the load in this case being 300 kilogs. Subsequently, Capt. Sunstedt took over this machine, and made a long flight over the surrounding country.

Cold Suspends Flying in Italy.

AT the end of last week an order was issued by the Italian military authorities suspending all flying at the military aerodromes for one month. The reason officially given for this action was the cold weather, but not unnaturally the order has called forth many protests from the pilots.

Swiss Army to Buy Machines.

FOLLOWING on the decision of the Swiss Government to organise a flying corps, a commission of four Army officers, with Oscar Bider, the Swiss pilot, as expert adviser, set out from Berne last week-end to visit the aircraft works and aerodromes at Mulhouse and Berlin.

Parmelin to Cross the Alps.

PARMELIN has arrived at Geneva with a Rhone-engined Deperdussin monocoque, with the object of making an early attempt to fly from Geneva across the Alps to Turin.

Flying Meetings in Egypt.

A SERIES of flying displays are to be given at Heliopolis from the 19th to the 22nd inst. It is stated that arrangements have been made with Chevilliard with his Farman, and Pegoud with his Blériot, to give demonstrations of looping the loop, etc., several times daily. It is also hoped that other aviators will take part in the meetings.

Rigid Airships for Italy.

ALTHOUGH no details are available, it is reported that the Italian military authorities have decided upon the construction of four rigid dirigibles, each of 30,000 cubic metres capacity.

⊛ ⊛ ⊛ ⊛

A ROUND-THE-WORLD RACE.

IN connection with the San Francisco Panama Exhibition, which opens next year, the authorities propose to organise a race for aeroplanes round the world, and sanction has been given to the scheme by the Aero Club of America. It is proposed that the start should be during May, 1915, while a time-limit of 90 days will be set for the competitors to complete the flight of about 22,000 miles.

The first prize will be £20,000, the second £6,000, the third £4,000, while it is expected that there will be a balance of about £60,000 to be divided among the other competitors. The course proposed is indicated upon our sketch map of the top of the world, and will be across the United States to New York, and thence to Belle Isle. From this point the Atlantic will be crossed by Cape Farewell, Greenland, and Iceland to Stornoway in the Hebrides. From there Europe will be traversed by way of Edinburgh, London, Paris, Berlin, Warsaw, St. Petersburg, Moscow, and the Trans-Siberian Railway will then be followed through Manchuria to Vladivostok. Korea will be the next point, from whence crossing to Kobe and passing over the Sea of Japan, the course will be north to Kamchatka, in Siberia, and on to East Cape. The competitors will then cross the short stretch of water to Alaska, and finally reach San Francisco by way of Vancouver and Seattle.

⊛ ⊛

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending January 31st:—

Flying Depôt. S. Farnborough.—The officer pilots were out daily during the week, and experimental work and repairs were continued as usual.

No. 2 Squadron. Montrose.—Reconnaissance training was recommenced in the squadron since the move to the new aerodrome is now completed.

No. 3 Squadron. Netheravon.—Machines were out nearly every day of the week.

No. 4 Squadron. Netheravon.—The Officer and N.C.O. pilots of the squadron made numerous flights during the week, and some experimental work was carried out.

No. 5 Squadron. S. Farnborough.—Several machines were out during the week, with a total of 27 hrs. 14 mins., and a total mileage of 1,709 miles was flown.

No. 6 Squadron. S. Farnborough.—This squadron is now being formed and organised by Capt. Becke.

Royal Patronage for Olympia Again.

HIS MAJESTY THE KING has once again shown his practical interest in the aviation industry by graciously extending his patronage to the forthcoming International Aero, Marine and Stationary Engine Exhibition, which is to be held at Olympia in March from the 16th to the 21st inclusive.

A 21-Mile Glide by an Avro.

FOLLOWING up his fine flight at Brooklands on Sunday of 1 hr. 5 mins., during which he went up to 11,500 ft., F. P. Raynham on Tuesday on the 80 h.p. Gnome-Avro, with Mr. Harold Blackburn as passenger, climbed to 15,000 ft., and, with the engine and propeller stationary, glided the 21 miles to Hendon, arriving at Hendon at an altitude of 5,000 ft. There was a strong following wind. The British height record stands to the credit of Hawker and the Sopwith machine at 11,450 ft. Raynham's climb was not officially observed, but he hopes to repeat it next week, under official observation. The return journey to Brooklands was made late during the afternoon.

⊛ ⊛

Bolstering up Advertisement Pages.

OUR contemporary the *Aeroplane* in last week's issue draws attention in a paragraph, of which the following is an extract, to what would appear to be a most reprehensible practice:—

"A WORD TO ADVERTISERS.

"One regrets to find that those responsible for a certain paper concerned with aircraft are reduced to padding out their advertisement pages with advertisements which appear contrary to the instructions of the advertisers, or of a size greater than that stipulated by the advertisers. Documentary evidence to this effect is in our possession. One would remind manufacturers and potential advertisers in general of a commercial axiom which says that advertisements which cost nothing are worth precisely what is paid for them. Also, there can be but little satisfaction in ordering and paying for that which one knows other people get for nothing. One would not draw attention to this point but for the fact that the practice to which reference is made above gives a spurious air of affluence to a paper and is calculated to deceive new advertisers as to the respective values from an advertiser's point of view of the various papers dealing with aircraft."

Personally we have no evidence or data upon which to say whether our contemporary is correct in its statement or not, but we need hardly say that if such systematic and deliberate bolstering up of advertisement pages, as is suggested, has been resorted to, as to warrant this otherwise very libellous statement, the sooner the facts receive the light of day the better, so that it may be generally known with whom such a practice rests.

CORRESPONDENCE.

The R.A.F. and the Industry.

[1833] It is certainly about time this heated question was settled; and the first matter is to define the position and to state exactly what is wrong. People talk of the industry as if the various firms were one and all absolutely similar, but such is far from being the case.

They are divided roughly between the two extremes of what one might term the "Designers" and those who build to R.A.F. designs, *i.e.*, the "Designees."

Mr. Walton Newbold, in his new book "The War Trusts Exposed," condemns the present policy of the country paying for the upkeep of the R.A.F. for the benefit of the private industry, *i.e.*, those whom I term the "Designees." Naturally those at the other end, *i.e.*, the "Designers," do not want the R.A.F. at all, and so on with the various grades between these two extremes.

The present complication has arisen because there has never been a clear and definite statement as to the official R.A.F. policy. Is the R.A.F. to design and incidentally to guard the country's interests in the purchase of aeroplanes, or is its position to be that of technical expert to the War Office and, incidentally, to carry out experimental work? Again, are we to look to it at all for the supply of our machines?

The R.A.F. appears to be doing a bit of everything, which always proves fatal, for it invariably ends up in no job being satisfactorily performed.

If we want to encourage the very best in aeroplanes, most people will be agreed that we must buy in the open market. Nobody can object to the Government having a body of technical experts to attend to this buying, and the R.A.F. are quite able to see to this; but if the R.A.F. is to have the slightest control in the buying, then they must not design or make aeroplanes. I cannot imagine any man, or body of men, so wanting in human nature that they did not consider their own production to be the best. If I were a designer and entered my design in a competition, I would think you very foolish indeed to make me the judge.

I think the above sums up the position, and has the advantage of leaving out the unnecessary trimmings.

If the War Office will thoroughly overhaul and rearrange the present constitution of the R.A.F. and its duties without any further delay, it would bring this very unpleasant feeling to an end before it becomes very much worse.

February 3rd. "OCTOPUS."

Stability of Aeroplanes.

[1834]. I have been reading with very great interest in your valuable journal the paper by Mr. Bairstow and the discussion on it, and it seems to me that Mr. Bairstow's definitions of stability are about the best yet evolved. I do not understand even yet why inherent stability is not preferable to automatic stability. In the former the self-righting qualities are "the nature of the beast," and contrary to popular superstition, not detrimental to its controllability; in the latter they depend on some mechanically operated device and will disappear if the device breaks down.

Mr. Bairstow apparently favours inherent stability, but he sets out to obtain it by the use of fins and deep bodywork, if I understand him aright. But, if the functions of the fins, &c., can be fulfilled with less than their weight and resistance, then they are unnecessary, and I suggest that it would be best to use the Dunne V form of wings with down-rolled front edges at the tips, or some equivalent form. This type needs no tail, and no more bodywork than a Farman-type biplane. The Dunne machine from all accounts entirely satisfies the definition of inherent stability. It has made many uncontrolled flights; two, a straight and a circular one of about 1 min. duration each, if I remember rightly, under R.Ae.C. observation; another in which the pilot wrote a sentence on a piece of paper, leaving the machine to run its own course, and then the flight at Hendon, when Com. Félix tinkered with the engine. Another advantage is that it is a propeller machine, not a tractor like the H.P. or Etrich types, and so is much better suited for military purposes. Also, I believe that the Dunne principles of stability as applied in that machine are, unlike those of the H.P. type, not conducive to, and do not involve, any rolling to speak of, even in fairly gusty winds. Then there is the bogey of uncontrollability to be laid. People often think that a Dunne for instance cannot manœuvre so well as, say a Blériot. But, though I have no acquaintance with the Dunne machine except from what I have seen published about it, the fact seems to be that it is particularly easily controlled, however much the reasons assigned may be contested. Most of the opinions regarding inherent stability that I have read seem to show this prejudice about uncontrollability, which practical experience demonstrates to be totally unfounded. Experiments also show, and Mr. Dunne is reported to have stated expressly before the Aeronautical Society, that his machine does not roll when near the ground, so there is no need to "switch off" the stable qualities when landing or taking off. When Com. Félix left the controls locked for so long what prevented the machine from playing all sorts of awkward and perhaps disastrous tricks but its inherent stability? If he had left the controls unlocked, it would be like leaving a boat's tiller to bang about unlashed, which is not good for it. The Dunne turns into the gusts if left alone and so causes the sustentation to become equal under both wings. On this account it can be accused of bad directional stability with regard to its compass course, and justly so. But this entails no more mental labour than the steering of a boat by compass or otherwise in a rough sea does. The analogy is quite correct, because the Dunne cannot side-slip, &c., any more than a boat can, though it does not roll about like a boat. As for efficiency, which is the better: an efficient pair of wings dragging a large body and tail, or a slightly less efficient pair without these encumbrances? Again, I believe that the latter wings have been shown by experiment to be no handicap. Practice shows that in the Dunne machine the undeniable facts are: that it is not stiff or tricky in manœuvring, does not side-slip, nose dive, stall itself or pancake, and that it does not roll when near the ground. What more does anyone want but a reliable engine? I might add that Mr. Bairstow's definition is satisfied completely by Dunne gliders cut from notepaper with no bodywork, in calm and wind, and that they do not roll or buck about in any way.

Apologising for trespassing on so much of your valuable space.

Dublin, February 2nd. W.F.G.

Safety Aeroplanes.

[1835] With regard to the question of the dihedral system of planes raised by your correspondent B^2, letter No. 1820, I fail to see that the reply thereto set out in letter No. 1831 is any argument against the development of the pronounced dihedral angle.

The end losses referred to can easily be utilised with advantage, as in the case of the finest inherent stability machines of the present time where the pronounced dihedral is a leading feature, the wing extremities being curved sightly downwards. It will be seen that the upward deflection of the air means a uniform concentrated lift at the plane ends; this I consider is of great importance to the "even keel" theory. Furthermore, side gusts would tend to deflect the windward wing, assisted, of course, by a low fuselage surface.

I also do not agree with your correspondent when he says that "No well designed aeroplane will glide upside-down unless held so by the use of the controls by the pilot." Accidents of late have proved that planes possessing little or no dihedral are quite capable of landing gently on their backs, with or without the pilot on board.

Battersea, S.W., February 2nd. JOHN W. ROBINS.

A System for the Classification of Aeroplanes.

[1836] Although the science of aviation continues to make rapid strides, the advent of a fixed system for the classification of aeroplanes appears to be as far off as ever.

The object of any method of classification should be to produce a system as comprehensive as possible with the least possible amount of change in the terms in general use. It should take into consideration not only the forms at present in regular use, but also possible changes which may arise in the future, which, if unprovided for, would in due course break down the system.

The first classification of aeroplanes was naturally based on the number of sustaining surfaces. Thus machines were divided into monoplanes, biplanes, triplanes, &c. As the number of different types increased, it was soon found necessary to subdivide these divisions in order to make exact description easier.

One system adopted was limited to biplanes, and was based upon the position of the screw by which the machine was driven—namely, whether it was a "Propeller" or a "Tractor." This method is exceedingly weak, as it is possible to have machines practically identical in construction driven by either tractors or propellers. For example, the D'Artois biplane, which, whilst belonging to the "Tractor" type of construction, must be classed as a "Propeller" biplane, as it is driven by a propeller at the extreme tip of its tail. Now the "Propeller" biplanes include the Henry and Maurice Farman machines, which bear no resemblance whatever to the D'Artois biplane, which obviously belongs to the same main type as the Avro and Breguet. Again, the Caudron biplane, which falls within the "Tractor" class, is of an entirely different type of construction to the Sopwith and B.E. 2, which also belong to this class. The inefficiency of this method of classification was shown when Messrs. Short Brothers produced a biplane driven by one propeller and two tractors. This has resulted in the mere statement that a machine is of the "Tractor" type or "Propeller" type being insufficient to convey an exact idea of its appearance without a detailed description being added.

Another form of classification, which is common to both monoplanes and biplanes, is based on the position of the directional surfaces relative to the main planes. In most types these are at the rear extremity of the machine, and the term "Canard" has been adopted to describe an aeroplane in which the usual order is reversed.

Some time ago the writer suggested an alteration in the system of classifying biplanes, based on the form of framework used to connect the directional surfaces to the sustaining surfaces. This was the use of the terms "Fuselage" and "Outrigger" as distinctive names for the two chief types of biplanes. The time, however, was hardly ripe for a change, as the number of types was not so great as at present, and design in general was more unsettled.

It is the object of this letter to suggest a more comprehensive scheme of classification than has yet been attempted. Briefly, it consists of the adoption of the four terms "Fuselage" "Outrigger," "Canard," and "Pendulum" in conjunction, so as to produce a number of subdivisions which will cover practically every type of machine. The first three terms are already in general use and need no explanation. The term "Pendulum" was suggested in connection with the controversy that at one time raged around the Train monoplane, and others of a similar type, in which the pilot is seated beneath the sustaining surfaces, which were supposed to be unstable on account of the "pendulum action" set up when turning. The word is used to denote a machine built on this principle. With these four terms it is possible to make six subdivisions which can be applied alike to monoplanes or biplanes.

Taking the biplanes first, they are as follows:—(*a*) Fuselage biplane; (*b*) Pendulum-Fuselage biplane; (*c*) Canard-Fuselage biplane; (*d*) Outrigger biplane; (*e*) Pendulum-Outrigger biplane; (*f*) Canard-Outrigger biplane.

Probably the best method by which to show that these subdivisions cover all classes of aeroplanes at present in existence is to supply a few illustrations of each type.

(*a*) Fuselage biplane (a biplane in which the rudder and elevator are attached to a *fuselage*):—Avro, B.E.2, Breguet, Sopwith.

(*b*) Pendulum-fuselage biplane (a "Fuselage biplane" in which the seating accommodation is beneath the lower plane. This type is at present only represented amongst hydro-aero craft, and is commonly called an "air boat"):—Lévêque, Denhaut, Curtiss, Bénoist.

(*c*) Canard-fuselage biplane (a "Fuselage biplane" flying "tail first"):—Voisin canard, Pont.

(*d*) Outrigger biplane (a biplane in which the rudder and elevator are attached to the main planes by means of outrigger booms):—Henry Farman, Maurice Farman, Caudron, Champel.

(*e*) Pendulum-outrigger biplane. (An "outrigger biplane" in which the seating accommodation is beneath the lower plane.) This type is at present only represented amongst hydro-aero craft:—Sopwith bat-boat, Radley-England.

(*f*) Canard-outrigger biplane. (An "outrigger biplane" flying "tail first"):— . . . . (?)

It will be seen from the above examples that only one of the classes appears to be unrepresented at the present moment.

Taking the monoplanes, they are as follows:—

(*a*) Fuselage monoplane (a monoplane in which the rudder and elevator are attached to a *fuselage*):—Blériot, Bristol, Morane-Saulnier, Nieuport.

(*b*) Pendulum-fuselage monoplane (a "Fuselage monoplane" in which the seating accommodation is beneath the wings):—Vinot, Morane-Saulnier ("Parasol").

(*c*) Canard-fuselage monoplane (a "Fuselage monoplane" flying "tail first"):—Blériot canard.

(*d*) Outrigger monoplane (a monoplane in which the rudder and elevator are attached to an outrigger):—Mersey, Borel "warplane."

(*e*) Pendulum-outrigger monoplane (an "Outrigger monoplane," in which the seating accommodation is beneath the wings):—Blackburn (early), Demoiselle, Moreau (automatic stability), Train.

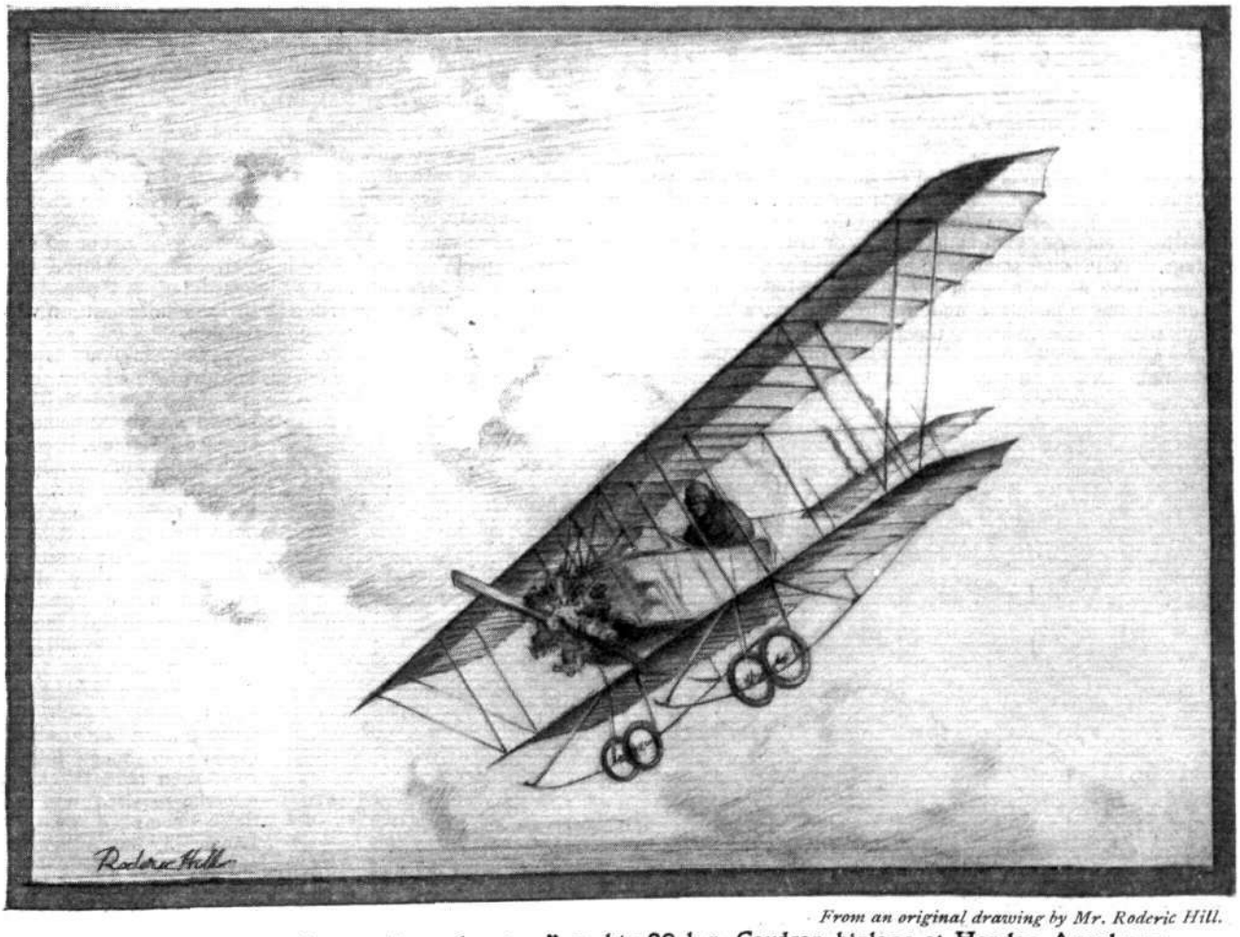
(*f*) Canard outrigger monoplane (an "Outrigger monoplane," flying "tail first"):—Valkyrie.

For the sake of abbreviation in print, the initial letters only of the distinguishing terms might be used. Thus a Train monoplane would be a type "P.O." monoplane, and the Voisin canard a type "C.F." biplane.

It will be noticed, by comparing the examples given under each type, how naturally machines in which the main constructional details are alike fall into the same class.

The only exception which I have been able to discover up to the present time is the Dunne machine. As this has no elevator or rudder, in the ordinary sense, it is quite impossible to class it under this system.

Vincent Square. C. NICHOLSON.



From an original drawing by Mr. Roderic Hill.

Edward Baumann's "return from the stars" on his 60 h.p. Caudron biplane at Hendon Aerodrome.

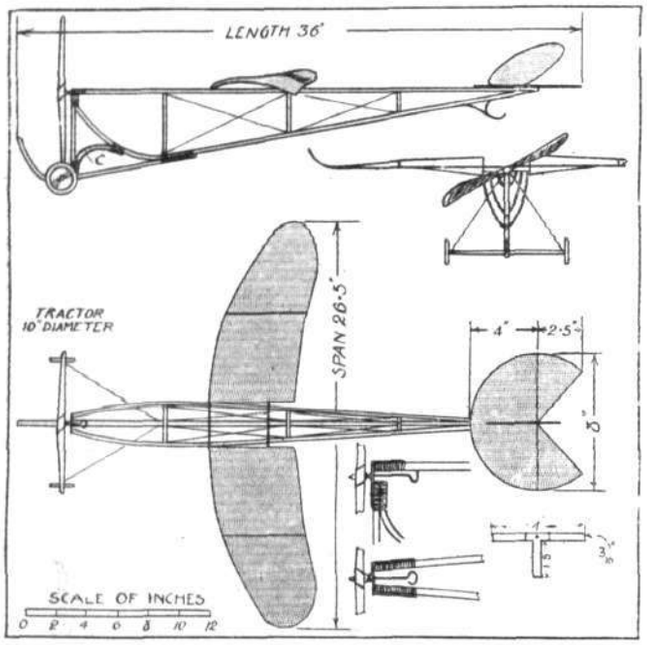
Models

Edited by V. E. JOHNSON, M.A.

A Simple Tractor Monoplane.

THE accompanying scale drawings and the following particulars of a small model tractorplane are sent us by Mr. R. Pinniger. The main planes are constructed of 18 s.w.g. piano wire, and the tail and rudder of 20 s.w.g. The *fuselage* is made from $\frac{3}{16}$-in. poplar, with $\frac{3}{16}$-in. by $\frac{3}{16}$-in. bamboo for the struts.

The landing chassis consists of a skid of hickory, to which a vertical strut is attached by means of a T-socket, which is also bound higher up to the bearing and one of the longitudinals.



Mr. R. Pinniger's tractor monoplane.

Further, a piece of bamboo is attached as shown at C, and the axle is fixed rigid on to the skid. The wheels are 2 ins. in diameter, and were obtained from Messrs. J. Bonn and Co.

The bearing is constructed from a T-piece of brass, as shown in the drawings. The tractor screw is 10-in. diameter and 18-in. pitch.

The reason why an opening is left in the central part of the trailing edge of the main plane and the join-up is made towards the leading edge is that it leaves the trailing edge more flexible, and enables a small angle of incidence to be given to the main plane if desired.

Mr. R. V. Tivy's Steam-Driven Model.

We give this week an illustration of this model, a brief account of which appeared in our last monthly report under The Bristol and West of England's Aero Club's model notes, p. 129. Mr. Tivy, in his communication accompanying the photograph says: "The loading will probably strike you as being quite abnormal. However, the machine rose at quite a low speed when it was driven by a rubber motor, the loading then being 17·6 oz. per sq. ft. At the time of leaving the ground fully half of the wing was at a negative angle. As mentioned in the report, the speed at which the model will leave the ground with the engine on board has been found to be about 20 m.p.h. My contention is that for a given engine power a 'Weiss' wing will carry about double the loading employed on the power-driven machines of the present day, and I do not think that the experiments with a full-size 'Weiss' machine which are, I believe, to be conducted will disprove my assertion.

"The difficulties I have experienced so far with my steam plant have been entirely concerned with my lamp, and I must ask you to keep an open mind (as I am trying to do) as regards the possibilities of a plant of this kind, until my experiments have proceeded a little further."

Referring to our correspondent's last statement, we do not quite understand it. If the inference is that we are asked to keep an open mind *re* the possibilities of this type of plant in general, and not our correspondent's in particular, then there is no necessity for us to do so at all, because the writer has in his possession a blow lamp which is perfectly satisfactory and efficient. We quite understand Mr. Tivy's difficulties in this respect: it is the crux of the whole problem, and it took, we believe, Mr. H. H. Groves some three years to solve it experimentally; but the problem is a solved one, and Mr. Groves has published the results of his experiments, with respect to which Mr. Tivy is at liberty to take the fullest advantage.

Mr. Tivy adds that he hopes to exhibit the model at Olympia; we trust that he will do so, and that we shall have an opportunity of seeing the plant running (in the annexe, say). Something of this kind would greatly add to the interest of the Show in general.

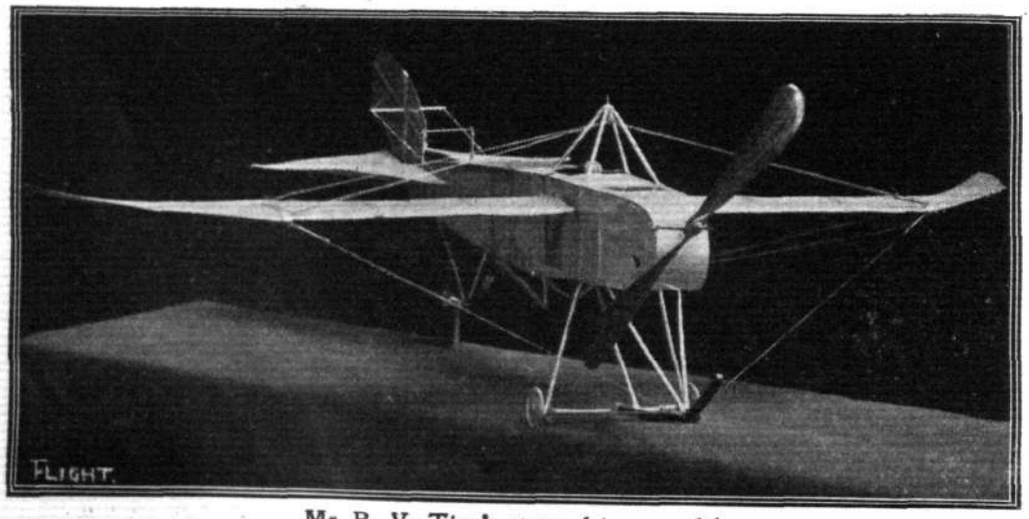
Mathematical Formulæ for Model Workers.

"For some time past it has appeared to me," writes Mr. A. E. Wollard, "that, in spite of the fact that many model makers are experimenting with regard to shape of planes, aspect ratios, cross sections, &c., it has been extremely difficult to take advantage of the data so gained.

"To be able to make proper use of this data, I contend that it is necessary to put the deductions into correct mathematical formulæ. Also, if the world is to benefit by the model makers' experiments, it is absolutely necessary to arrive at some definite basis on which to make any calculations that may be required.

"It would doubtless be an easy task for an experienced mathematician to compile formulæ, but although I know that there are many aeromodellists who have studied mathematics, the absence of formulæ in connection with model work—and I should judge that from Mr. Handley Page's recent lecture that the same formulæ would be applicable to full-sized machine work—suggests that they are either non-existent or are of such an incorrect and inconsistent character that it would be unwise to publish them.

"In writing this I know that I am laying myself open to criticism, and perhaps some will think, even though they do not voice their remarks, that for all formulæ required why not use those compiled by Eiffel, Lanchester and other experts. My answer to this is that model makers want to find out for themselves the basic principles, and even if the results should prove



Mr. R. V. Tivy's steam-driven model.

the same as those supplied by the authorities on the subject, they will be understood more fully than any amount of reference work.

"Personally, I have no suggestion to offer as to how this is to be accomplished, but I hope that by bringing this point forward, some help may be derived from any subsequent discussion."

[We shall be glad to hear what any of our readers have to say on this subject.]

Report of Experiments with the Shorter Monoplane.

By L. G. RYLEY (The Coventry Aero Club).

Trials with the above type of machine (described in FLIGHT, November 22nd, 1913) were carried out a few weeks ago, and for the benefit of other readers who may be considering the question of constructing a similar machine, I am sending these results. Mr. Shorter is very busy at present, and the writer, who was present at the above, has been asked to write the report. I need not weary the reader by describing how we searched for a suitable slope, but I must describe the "aerodrome" itself. It consisted of a small "knob" in the middle of a somewhat small and "squashy" field. For a glider with good ash skids it would not have been so bad, but our 12" "pram-wheels" were continually sinking in. However, in due course, a fairly suitable Saturday arrived, and we transported ourselves and machine along. The monoplane being now erected, Mr. Shorter (minus hat, coat, and other weighty material) entered the pilot's seat, and two 10" [10'?] ropes were attached, one to each wing tip. One enthusiastic individual sprang forward and swung the propeller in fine style, and when the speed of same had increased somewhat, we started off down the hill.

Unfortunately the wind was only blowing 7 m.p.h., and the slope was on the flat side, with the result that the machine refused to rise. I had a faint idea of what towing was like, but I did not think it was as tough as this. On returning we noticed the wheel tracks down the hill, which explains why we could not get up sufficient speed for the machine to rise. The second trial, however, was more successful, for we ran much faster, and when about halfway down the slope the machine (with pilot aboard) made a few hops at about a foot off the ground. Several more hops were indulged in, but the duration could not be increased. The monoplane was then tried minus pilot and some good towed flights were obtained. During one of the latter the detachable joint in the *fuselage* gave way, when the machine landed heavily and so put an end to the sport. Nevertheless, I believe we all felt better for our 2½ hours' exercise in the open. Now for the conclusions. Readers will gather from the above that the narrow "pram-wheels" sinking in the ground was the cause of the trouble all along. The machine was originally intended to be tried on a smooth track (in fact the very first trial was carried out at such a place). With regard to the leather belt, this worked excellently up to a certain speed, but when Mr. Shorter endeavoured to go "all out" a slight slipping was perceptible.

However, as soon as the propeller speed decreased slightly, the belt again took up the drive excellently. When it was first decided to construct this machine the writer obtained a couple of bevel gears and the constructor the chain wheels, &c., but so many of those "know-all-about-it" folks kept advising us to use a belt that to satisfy our own curiosity as well we gave it a trial. Hence the experiment. With regard to the question of fitting a "freewheel" (FLIGHT, November 22nd, 1913), I think it an advantage to leave this out, as any momentum the propeller does possess could be used to assist the cranks over the "dead centre." However, Mr. Shorter firmly believes that if he built a second machine possessing more area, using the same propeller and an efficient chain drive, it is possible to do a few hops on level ground against a slight breeze.

Personally I think a machine of this type should be constructed similar to a rubber-driven model, *i.e.*, the controls should be fixed, or nearly so, as this would enable the pilot to give more attention to the pedalling. When a model is launched the extra power or "burst" of the "motor" makes the machine climb, and when the rubber "runs out" the machine automatically glides down. Now if a cycleplane could be constructed similar to this, and the pilot strapped in *à la* Pégoud, he (the pilot) could govern the height by the speed. All the pilot has to do is to travel "all out" along the track, and if the speed increases sufficiently the machine will rise automatically; if it does not, then alter the angle of the elevator slightly and try again.

[This suggestion certainly seems founded on common sense.]

Upturned Wing Tips.

Many aeromodellists will have read with especial interest Mr. W. E. Somerville's account of his full-sized experiments with upturned wing tips, as given in January 31st issue, pp. 108–109. For purposes of lateral stability, and more especially for prevention of side-slipping, the value of such have long been known to model workers, and some of the best known flyers have used them in one form or another in their machines for years. In the case of full-sized machines, there of course always arises the question of the personal control of the pilot to complicate the simpler questions of either inherent stability or a stability obtained by automatic means. A bicyclist naturally prefers a bicycle as it is, unstable naturally, he neither desires a machine stabilized by means of a gyroscope or any such mechanical device, even supposing such could be added to the machine without increase of weight, or the necessity of employing extra power.

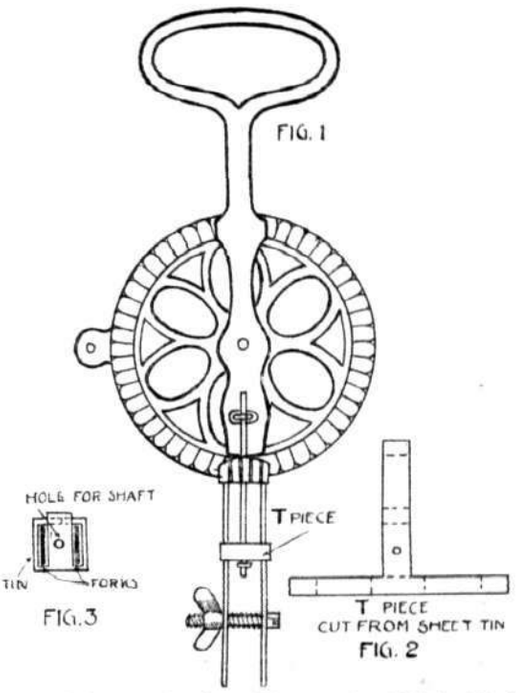
And to a certain extent one can fully appreciate a pilot's feeling in the matter, any stabilizing device must undoubtedly be of such a character as not to in any way interfere with the pilot's free control of the machine; nor must it, if possible, in gusty weather add to his discomfort by giving him greater stability at the expense of a considerable increase in pitching and rolling; for such a system, however, favoured by inventors, will certainly never be used by those who have the actual flying of machines.

How far the system of upturned wing tips fulfils these conditions is a matter with respect to which probably considerable difference of opinion exists. So far as upturned tips *v.* dihedral angle is concerned, from the very large number of model experiments that I have seen on this point, I have no hesitation in saying that upturned wing tips is by far the better system of the two.

How to Make a Simple Winder.

By J. E. ROGERS.

Procure an ordinary egg-beater, remove the bottom part of the same, and the small cog with its shaft furthest from the big cog, so that it is left as shown in Fig. 1. Next cut out a piece of tin T-shape,



bore a hole and bend at the dotted lines, so that it looks like Fig. 3, slip on the forks, make a groove round the shaft, put a copper wire ring in it and compress it tight. Solder the T-piece in position as in Fig. 1. Next procure a screw and wing nut. Drill a hole in each fork three-quarters of an inch from the bottom, pass the screw through the holes, and solder the head to the fork, and you have the winder complete.

Bamboo.

It is probably not too much to say that every practical experimentalist in aeronautics has at some time or another used bamboo in some part or another of his machines. It has been used (and smashed) in the case of man-carrying gliders probably more often than any other wood. For full-sized work, or, indeed, in any case where the "tube," be it large or small, is employed *entire*, it is not a success, and undoubtedly more than one fatal accident has happened through its use, but when employed in a proper and scientific manner, it is undoubtedly very hard to beat. It is an ideal substance for model work, but only the very best portion of the wood must be made use of. First of all a tube (the larger the diameter the better) should be procured of some convenient length, say 4 ft. This should be sawn from end-to end in strips, a quarter to half an inch wide, according to the size of the tube and the width of strip desired. These strips should next be planed on both sides, the soft inner pith all removed, ditto the knots and the hard outer shell. When this is done we have left a wood of great strength and also flexibility, most useful for skids and chassis on larger models, for the wing spars of smaller models (when some ⅛ inch wide), and for many other purposes. A wood which can be readily bent by the dry hea

process to practically any desired shape. It is not, of course, suitable for motor rods, or any purpose where rigidity is required. Years ago one employed small (entire) bamboo tubes for the motor rods of models, but these have long been superseded by the built-up and correctly proportioned and tapered hollow spar motor rods of the present day, of minimum weight and maximum strength where most needed.

Model Club for Burton and District.

Mr. Charles G. Lamb, 156, Shobnall Road, Burton-on-Trent, informs us that a model aero club has been formed, to be called the Burton and District Aero Club. Flying meetings are being held every Wednesday and Saturday afternoon, and meetings at the Y.M.C.A. the first Monday in the month for business, papers and discussions. Col. R. F. Ratcliffe, M.P., has kindly consented to become president, and a large membership is expected. Anyone wishing to join the club will be supplied with every information by applying to the secretary at the address given above.

An American Appreciation.

The following letter has been received from Mr. Charles R. Courtney (Chicago, U.S.A.), correspondent of the Illinois Model Aero Club:—"I have been reading FLIGHT, especially the Model Section, for about a year, that is since I first heard of it, and I think it is the best magazine containing a model section in the world—second to none." We are much indebted to our correspondent for his appreciative note, and we shall always be very pleased to receive from him any American aeronautical news of a model character.

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Single screw, hand-launched	Duration	D. Driver...	...	85 secs.
Twin screw, do.	Distance	R. Lucas ...	...	590 yards.
	Duration	G. Hayden	...	137 secs.
Single screw, rise off ground	Distance	W. E. Evans	...	290 yards.
	Duration	W. E. Evans	...	64 secs.
Twin screw, do.	Distance	L. H. Slatter	...	365 yards.
	Duration	J. E. Louch	...	2 mins. 40 secs.
Single-tractor screw, hand-launched	Distance	C. C. Dutton	...	266 yards.
	Duration	J. E. Louch	...	91 secs.
Do., off-ground	Distance	C. C. Dutton	...	190 yards.
	Duration	J. E. Louch	...	94 secs.
Single screw hydro., off-water	Duration	L. H. Slatter	...	35 secs.
Single-tractor, do., do. ...	Duration	C. C. Dutton	...	29 secs.
Twin screw, do., do. ...	Duration	L. H. Slatter	...	60 secs.

Aero Show.—Will all intending exhibitors forward at once their entries to the hon. sec., so that it can be seen if the estimated space allotted for models will be sufficient ?

Club Stands.—The Aero Models Association (Northern Branch) have reserved a stand, increasing club stands to eight.

Challenge Shield.—The handsome club challenge shield—presented by Mr. Thomas Farrow, Chairman of Farrow's Bank—is to be known as the Farrow's Bank Shield, and will be for competition among the affiliated clubs. It is hoped that every club of any note will compete for this. Photograph appears on this page. The size is 3 ft. high by 29 ins. wide.

The Farrow Shield.

27, Victory Road, Wimbledon. W. H. AKEHURST, Hon. Sec.

AFFILIATED MODEL CLUBS DIARY.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (27A, SEDGEMERE AVENUE, EAST FINCHLEY, N.)
FEB. 7TH, flying at Finchley 3 p.m.; Feb. 8th, 10 a.m.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).
FEB. 8TH, flying Wanstead Flats 10 a.m. If wet, meet at clubroom.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).
FEB. 7TH, flying at Sudbury. Competitions for show models.

UNAFFILIATED CLUBS.

Ilford Model Ae.C. (83, ENDSLEIGH GARDENS, ILFORD).
FEB. 8TH, flying as usual at Newbury Park (weather permitting).

Liverpool Aero Research Club (62, CEDAR GROVE, LIVERPOOL).
FEB. 13TH, general meeting at 8 p.m. In view of the programme that the club is endeavouring to put forth for the coming season, the hon. sec. will be glad to hear from persons interested in the Liverpool, Bootle, and Wallasey districts. Particulars of membership on application. Particulars will shortly be announced regarding the Aero Research Trophy competition.

Edinburgh Aero Club.

OWING to a disagreement between the senior section and the model section of the Edinburgh Aeronautical Society, the majority of the model members have resigned their membership and have formed a new club, which will in the future be known as the Edinburgh Aero Club. All communications regarding the new club should, in the meantime, be addressed to the secretary at 13, Hermand Terrace, Edinburgh. Meetings of the new club are held at Mr. Harrison's Studio, 46, Torphican Street, on Thursday evenings, at 8 o'clock; all interested are cordially welcome.

A Sunbeam for the Government.

IT is gratifying to learn that the War Office, through the Royal Aircraft Factory, have intimated to the Sunbeam Motor Car Co., Ltd., of Wolverhampton, that they are purchasing the 150 h.p. 8 cylinder Sunbeam aviation engine, which during the past few months has undergone some severe tests in the factory.

Nieuport Developments.

COMMANDER DELAGE (general manager of the French Nieuport works), M. Henri Kapferer, and M. Bazaine were in London at the beginning of this week in connection with the first board meeting of Nieuport (England), Ltd. We understand that some important constructional developments may be looked for shortly, and in the meantime it is interesting to learn that the armoured machine which attracted a considerable amount of attention at the Paris Salon has given very satisfactory results in its first trials at the hands of Dr. Espanet.

PUBLICATION RECEIVED.

Calendar, 1914. Kelvin Bottomley and Baird, Ltd., 16, 18, 20, Cambridge Street, Glasgow.

Aeronautical Patents Published.

Applied for in 1913.

Published January 29th, 1914.

10,216. SOC. ANON. L'AERA AND A. WUNDERLICH. Beating-wing mechanisms.
17,380. L. J. BERGDOLL. Aeroplanes.
22,124. SIEMENS SCHUCKERTWERKE GES. Airships with sub-divided inner chambers.
22,467. LUFTSCHIFFBAU-ZEPPELIN GES. Airship shed.

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT *will be forwarded, post free, at the following rates:—*

UNITED KINGDOM.	s.	d.	ABROAD.	s.	d.
3 Months, Post Free...	3	9	3 Months, Post Free...	5	0
6 ,, ,, ...	7	6	6 ,, ,, ...	10	0
12 ,, ,, ...	15	0	12 ,, ,, ...	20	0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., *and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.*

Should any difficulty be experienced in procuring FLIGHT *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*